FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP AUGUST 1, 1958

HYGIENE puts YOU on OUR metal!

ALUMINIUM Stacking Containers

- ★ Absolutely hygienic and easy to clean
- ★ Exceptionally strong rim obviating handles
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- ★ All sizes will interstack

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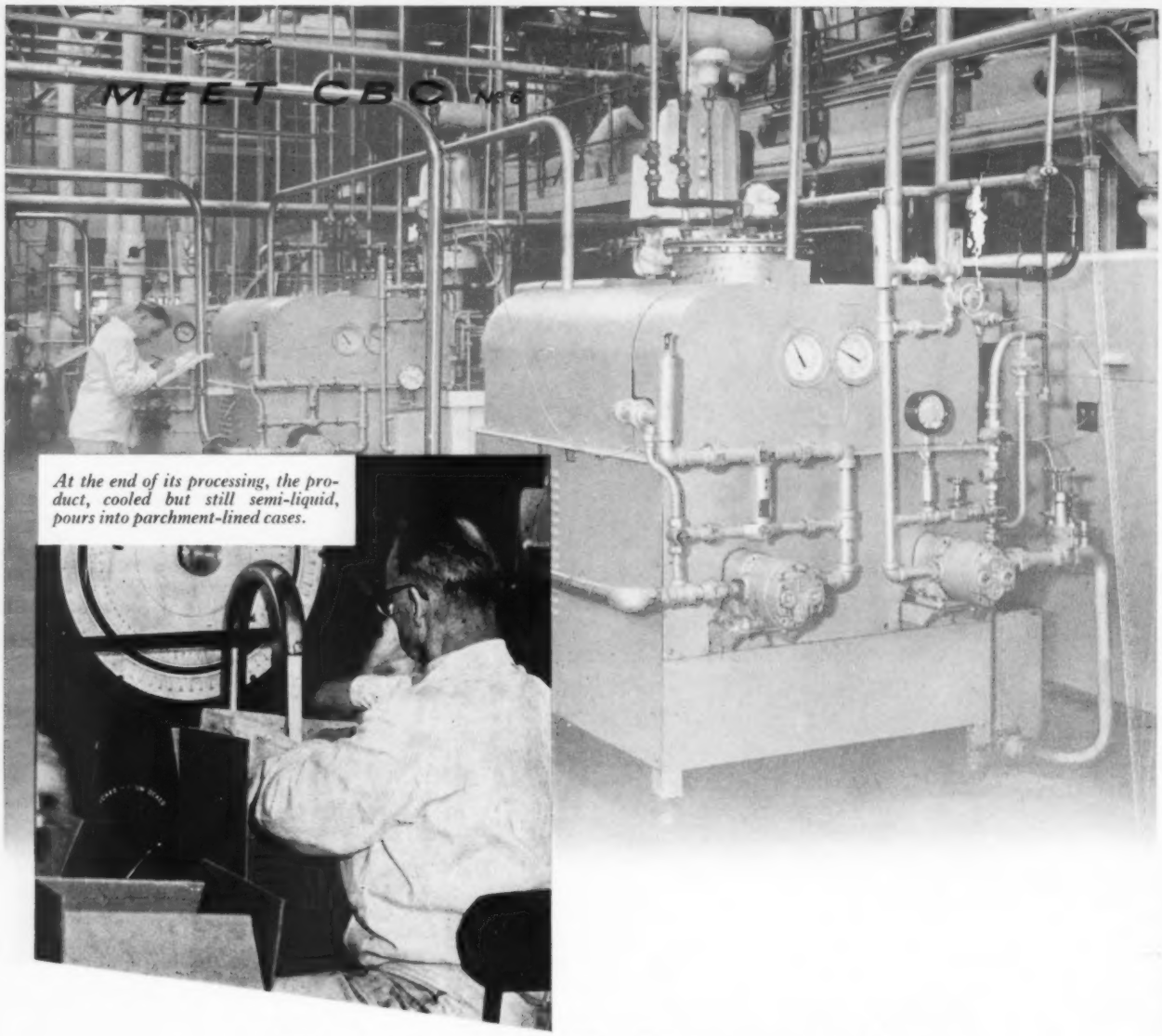

At the end of its processing, the product, cooled but still semi-liquid, pours into parchment-lined cases.

Controlled Processing

The task of producing blended fat of a workable consistency—at the rate of 10,000 lb. per hour—belongs to an ingenious machine called the Votator. This receives the warm liquid blend, together with milk if margarine is to be produced, then rapidly cools and texturises it. The blend is forced through a nozzle to give it that extra smoothness which is so important in any finished product carrying the CBC label.

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cakes, cake mix, ice cream, biscuits or pastry of any kind, one or more of these CBC quality fats will meet your needs:—

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Better results FASTER with the FOODTECH ROTOR CHOPPER

JET COOLING SYSTEM

This Rotor-Chopper is fully automatic. That means all variations between mixes due to the human element are completely eliminated. A simple setting of the controls ensures that any two mixes will be exactly alike—even if they are made a month apart. No pre-mincing. If you wish, an automatic ejector can be fitted so that the finished mix is entirely untouched by hand.

COMPLETELY EVEN CHOPPING AND MIXING—TIME AFTER TIME

ALL HANDWORK COMPLETELY ELIMINATED—CHOPPING TIME CUT BY 2/3rds.

CHECK THESE POINTS

1. Important. Two speeds are available for coarse or fine mix as extras.
2. Guaranteed up to 50% saving of labour costs.
3. Guaranteed no squeezing of meat and fat, therefore retaining bloom and colour.
4. No rise in temperature during chopping—mincing bowl insulated.
5. No pre-mincing or hand working; easily operated by unskilled labour.
6. This machine breaks down frozen meat blocks up to 24″ x 12″ in 25 seconds.

FOODTECH BULLETIN

90% of all complaints are discoloration and shrinkage of sausages. I assure you that with this Rotor-Chopper plus our MSB these troubles will disappear. Colour, texture and keeping qualities of the sausage will be guaranteed.

PRICES

Serial No.	Meat Capacity	Delivered Price
MK 20	20/25 lb	£242
MK 30	30/40 lb	£434
MK 40	40/50 lb	£481
MK 60	60/80 lb	£583
MK 80	80/100 lb	£657
MK 100	100/120 lb	£806
MK 160	160/200 lb	£1,457
MK 200	200/250 lb	£1,580

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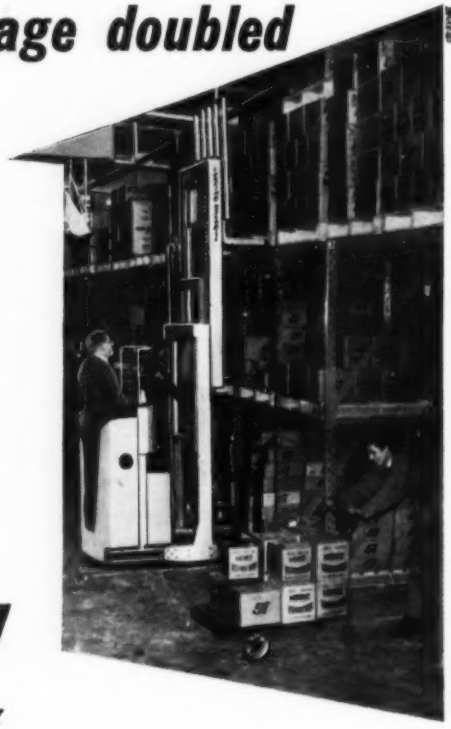

The Lansing Bagnall Reach Truck can handle one ton loads in gangways only half as wide as those for ordinary Fork Trucks. The Reach Truck enters the gangway with the load retracted within its wheelbase and then "reaches" it forward for stacking purposes.

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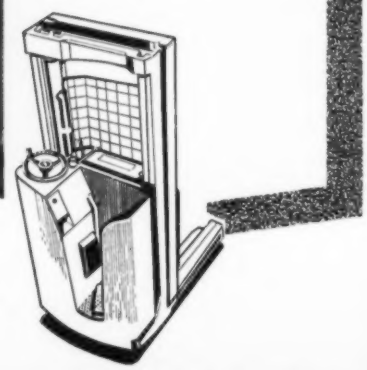

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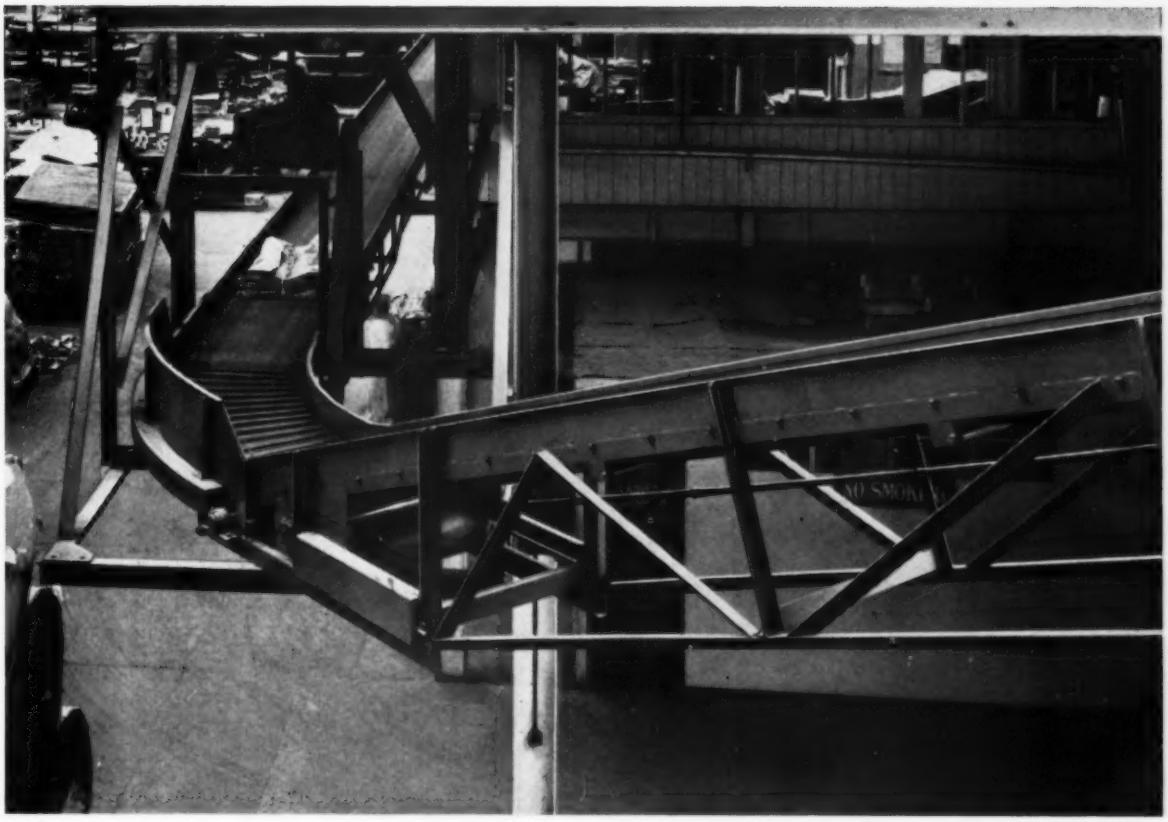
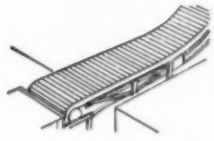
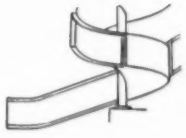
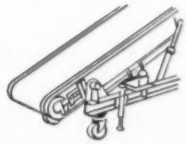
Trade Preview
on
WEDNESDAY
27th AUGUST 1958
10 am - 6 pm

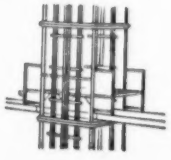
Admission 1/3d. (half usual price) to all members of the Trade, on presentation of business card or billhead to the box office at the entrance of the Grand Hall, Olympia.











Movement Problems are our Business

JENNERS are providing daily, individual solutions to the movement of all types of goods in every sort of size, quantity and condition. Nearly everyone knows that Jenners produce the items illustrated in the margin but fewer possibly realise that Jenners treat each job on its own merits and that each installation is TAILOR-MADE to the client's requirements.

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of liquid
foodstuffs - - -
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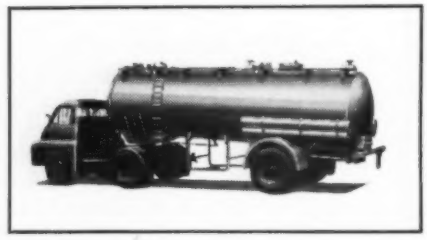

EDIBLE OIL

SUGAR

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MILK

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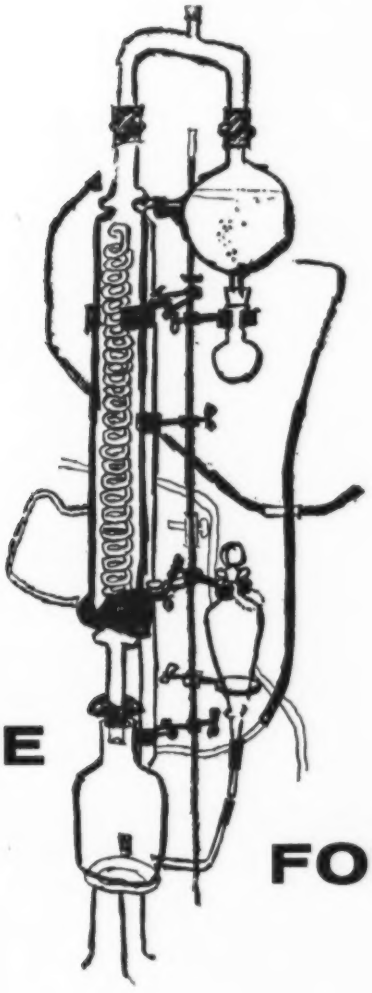

ROCHE FOR VITAMINS

A

Synthetic Vitamin A concentrates & powders
Synthetic beta-carotene

B

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Riboflavin & Riboflavin 5'-phosphate
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Calcium-D-pantothenate
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C

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E

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STAND NO. 22
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August 28th — September 11th
Percy Dalton's wide range of superb meat processing machines will also be on show at the Food Fair. Do not fail to see demonstrated the fabulous new Hollymatic Hamburger and Patty making machine and try a sample of the superb products it turns out.
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Reconstituted Whole Milk (400gms. to 5,100mls. water) . 4,248mls.
Chopped Mushrooms . . . . . 1,488gms.
National Flour . . . . . 402gms.
Hardened Palm Kernel Oil . . . . . 252gms.
Soyolk "A" (Soya Flour) . . . . . 150gms.
Salt . . . . . 132gms.
Sugar . . . . . 102gms.
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Onion Powder . . . . . 22.5gms.
M.S.G. . . . . 22.5gms.
Ground White Pepper . . . . . 2.4gms.
Ground Cloves . . . . . 0.48gms.
Bulk to 6,868mls. with water
AN EXCLUSIVE RECIPE FROM THE FREDK. BOEHM EXPERIMENTAL KITCHEN

The chopped mushrooms are pressure cooked in sealed containers for ten minutes at 240°F. (10lb. pressure per square inch). The rest of the ingredients are mixed to a smooth paste with the reconstituted milk powder and bulked to 6,868mls. with water and the strained mushroom liquor. The soup is brought to the boil and allowed to simmer for ten minutes and homogenised. The mushrooms are then added and the soup reheated to 200°F before filling the cans. No. 1 Tall cans should be processed for one hour at 240°F and water cooled.

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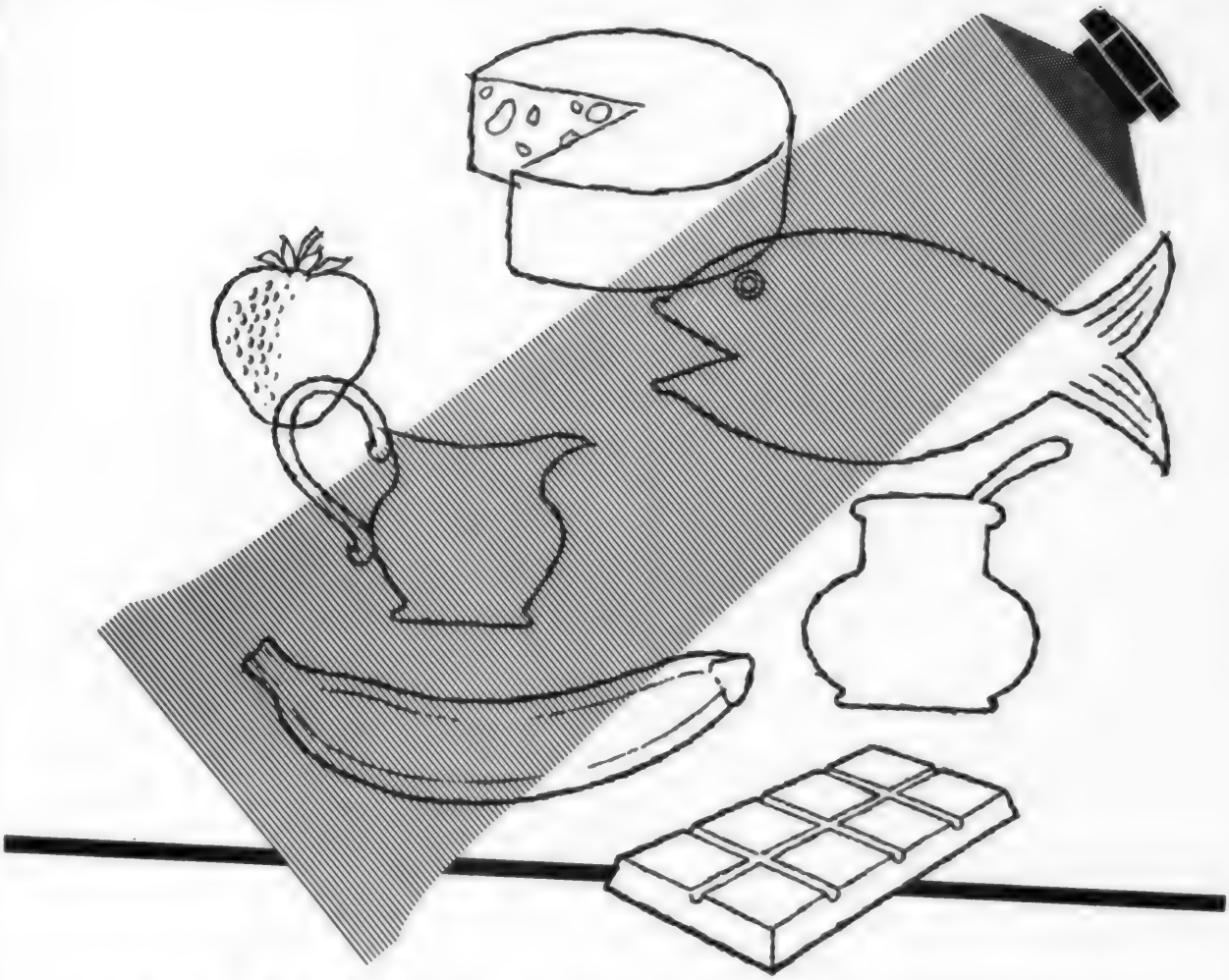

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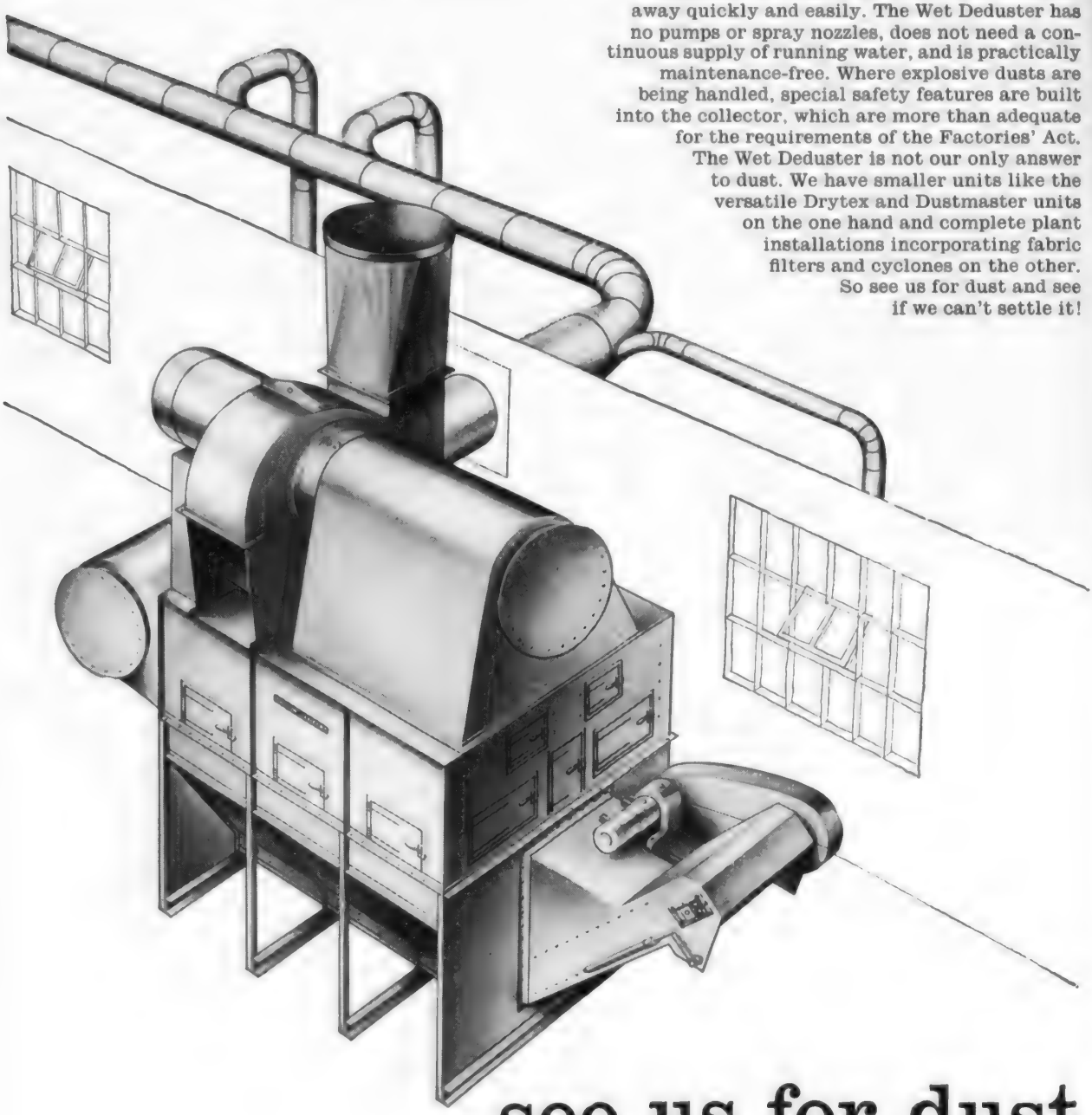

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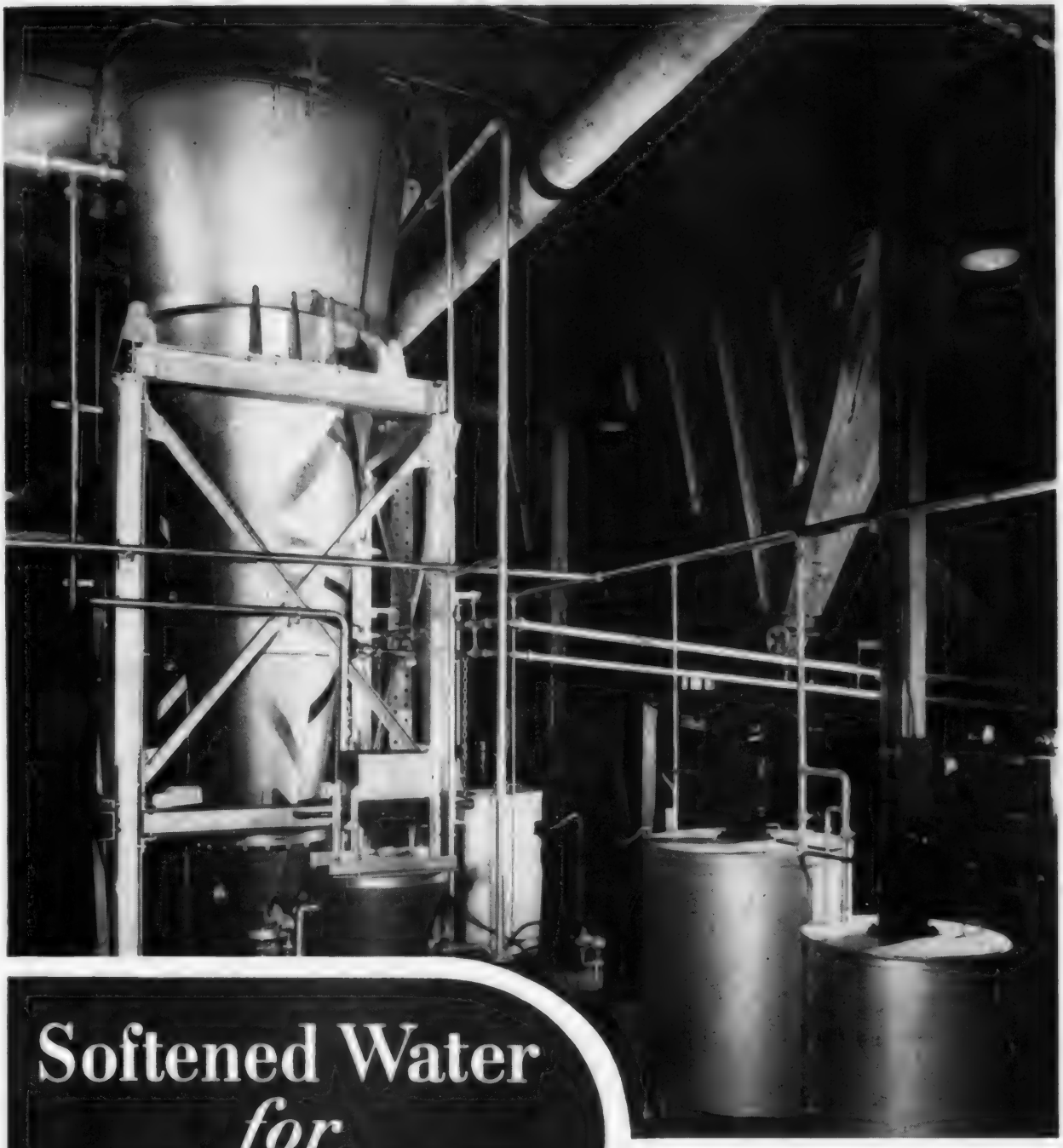

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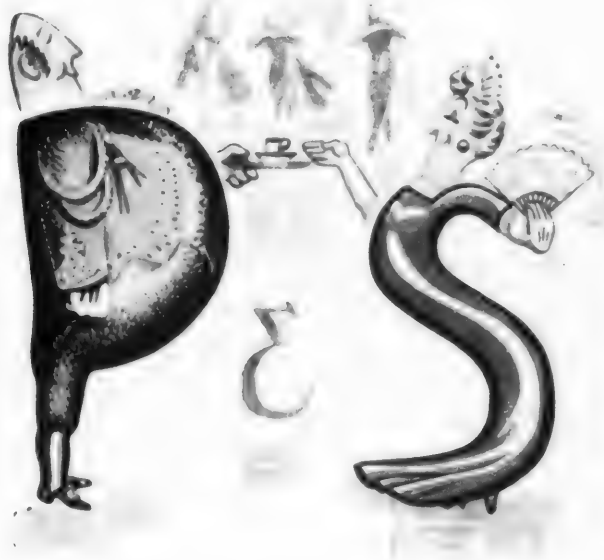

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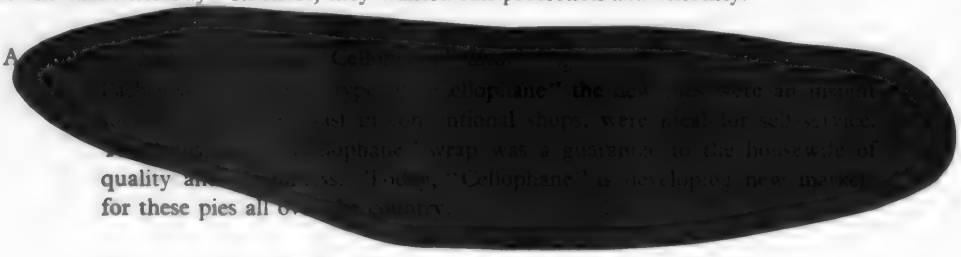

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"Cellophane" is made in a wide variety of types and gauges to meet the needs of every sort of product. There is a correct film for packaging pies, and we have developed special films to suit other foods—such as MXXT "Cellophane" for products that need exceptional protection from loss or gain of moisture. The most moistureproof film in the world, MXXT "Cellophane" is now being used to package an increasing number of food products with outstanding success. Drop us a line for expert advice on the right film for *your* packaging job.

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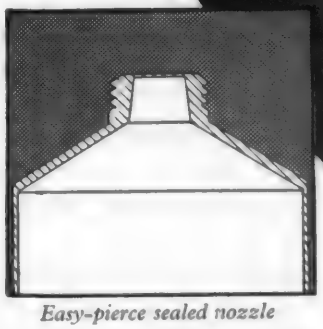
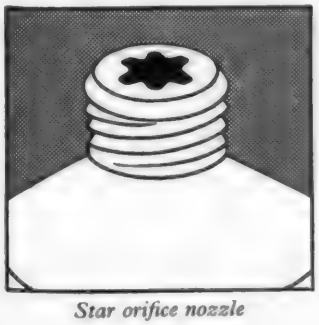


Easy-pierce sealed nozzle



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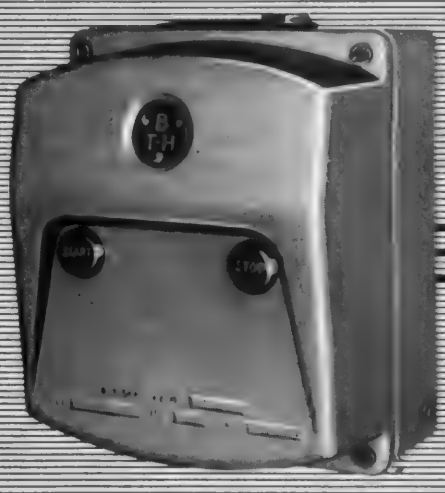

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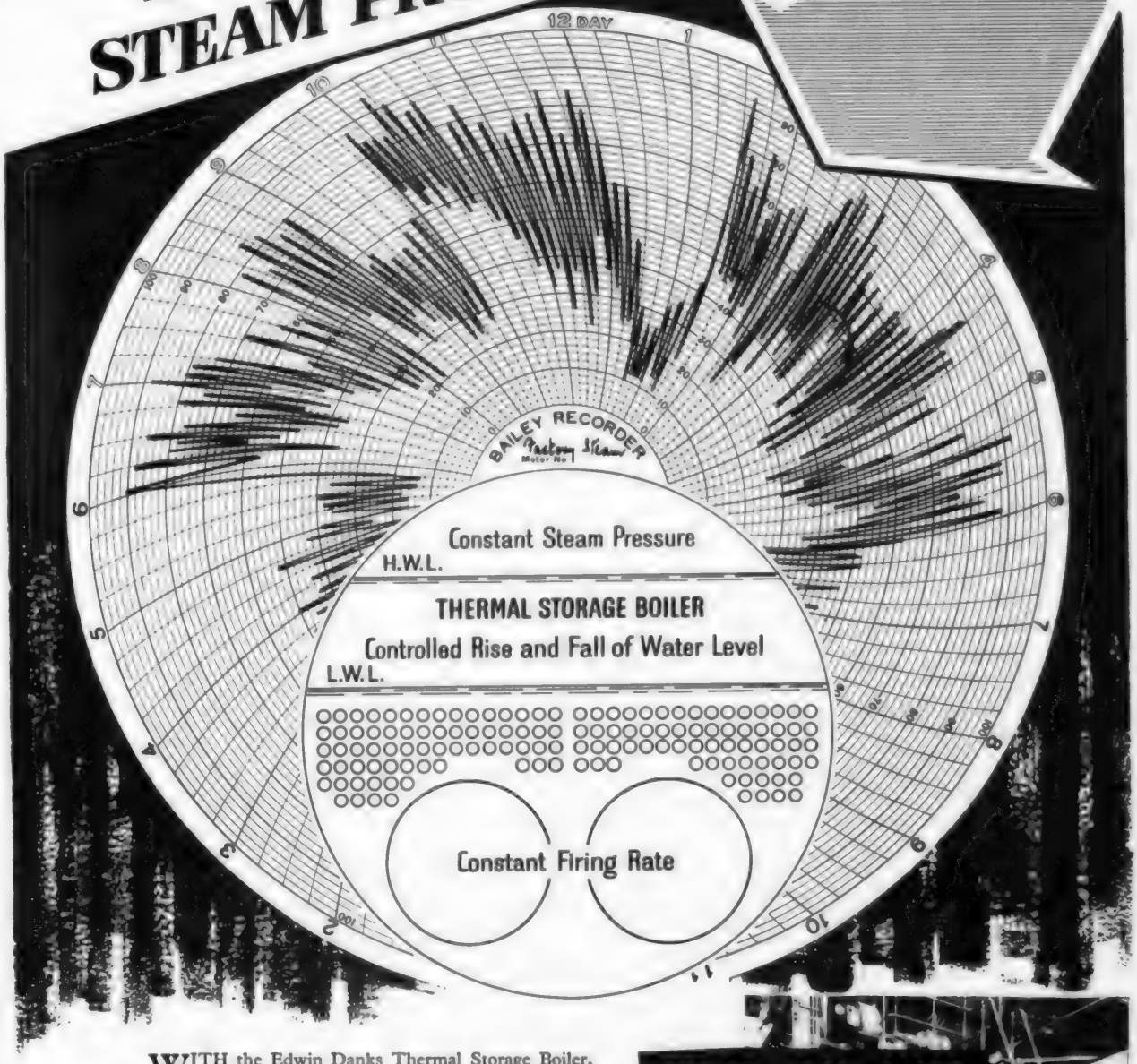

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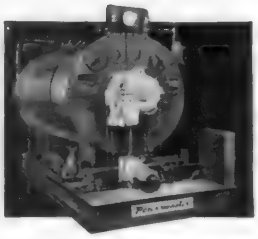

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- Takes up to 50% less space than conventional boiler unit.
- Simpler installation
- Reduced fuel costs
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- Over 80% efficiency — with the VORIFLOW oil burner
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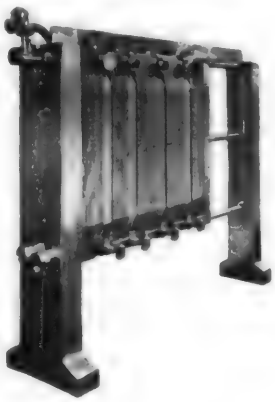

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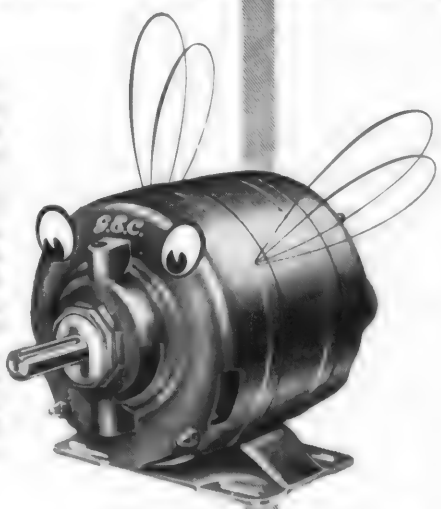

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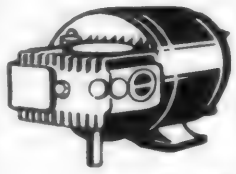
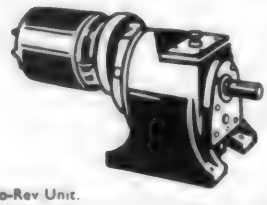
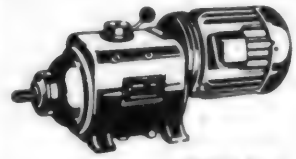


Worm-Geared Motor.



Slo-Rev Unit.



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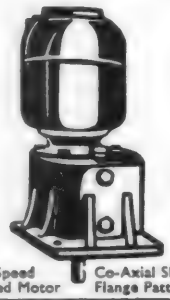

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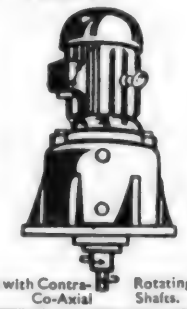

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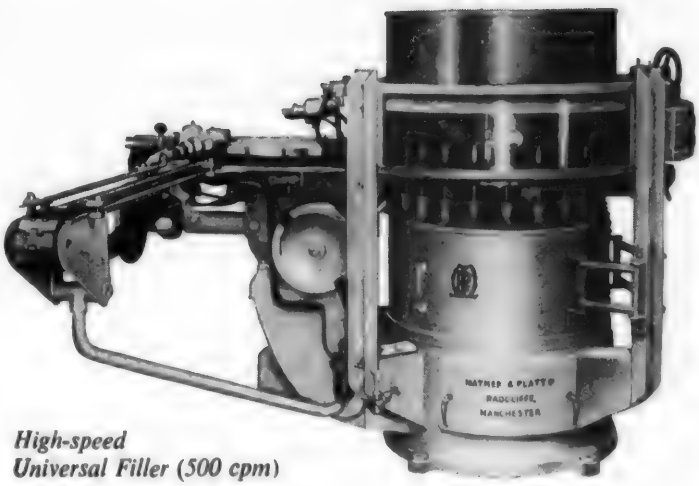

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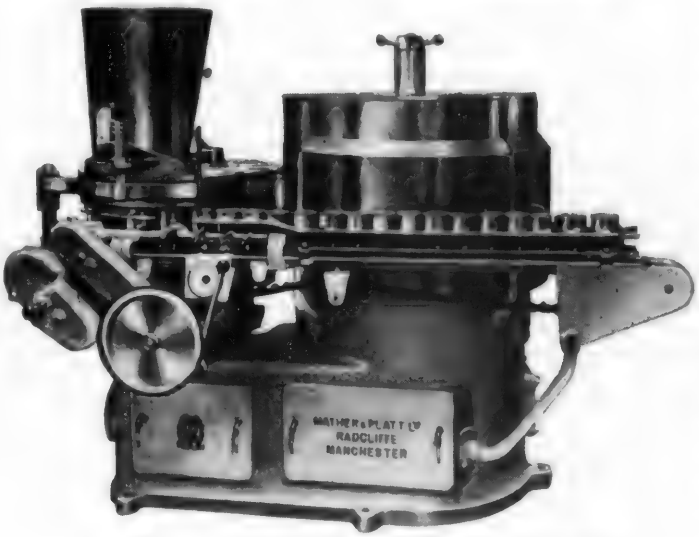

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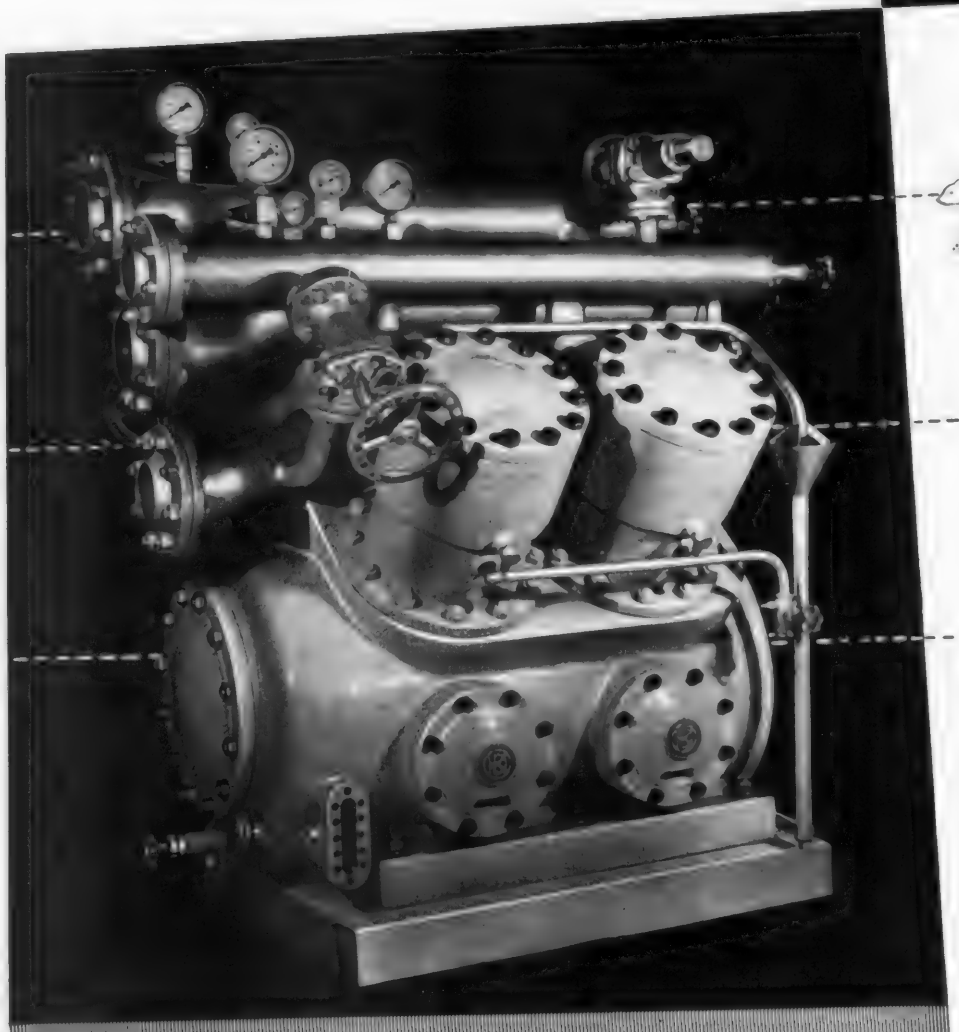

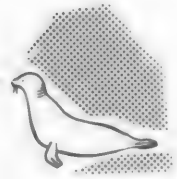

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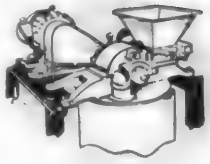

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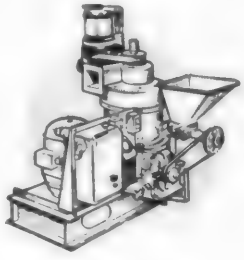

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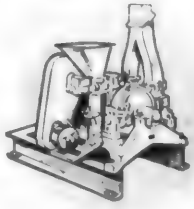

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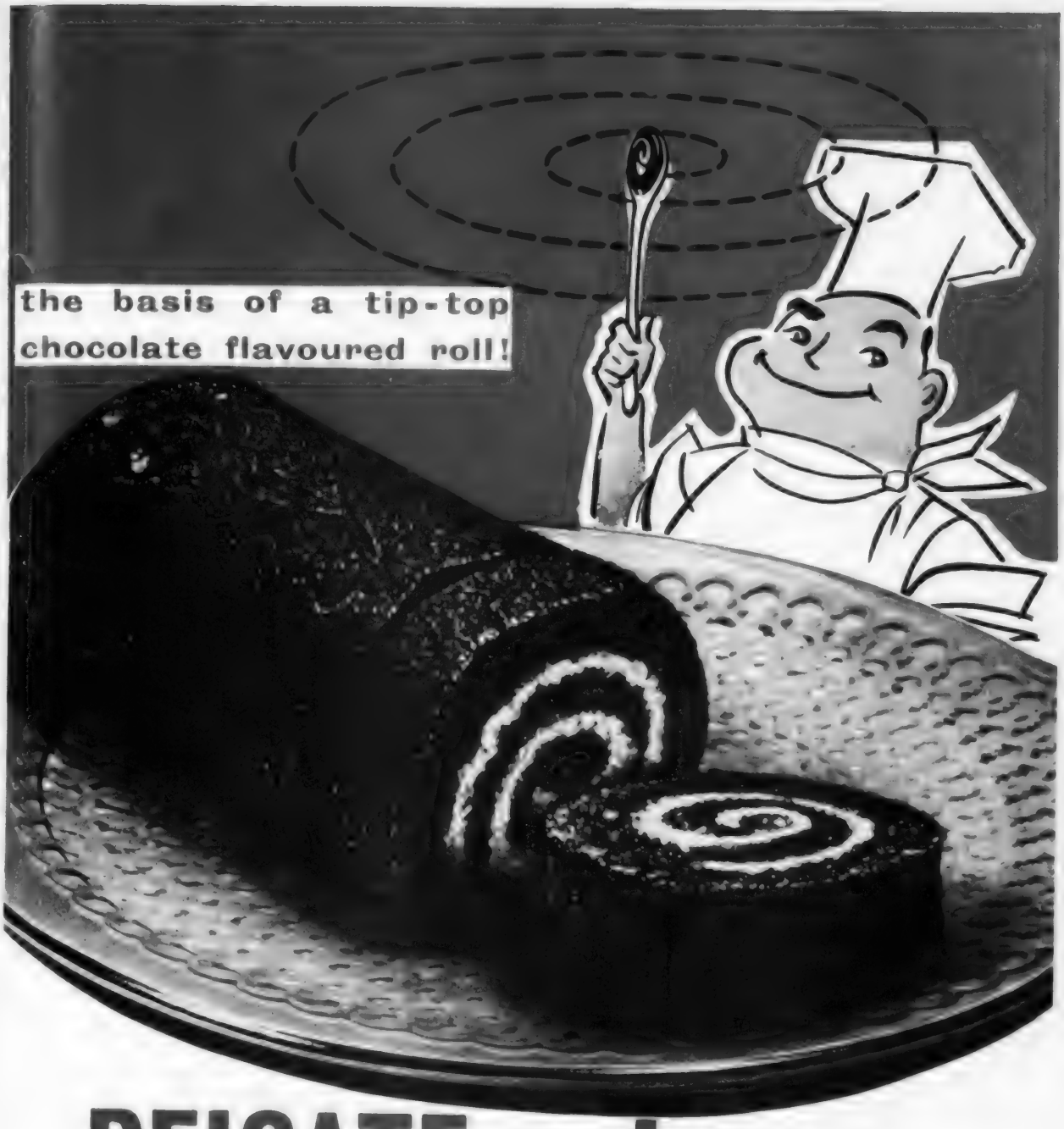

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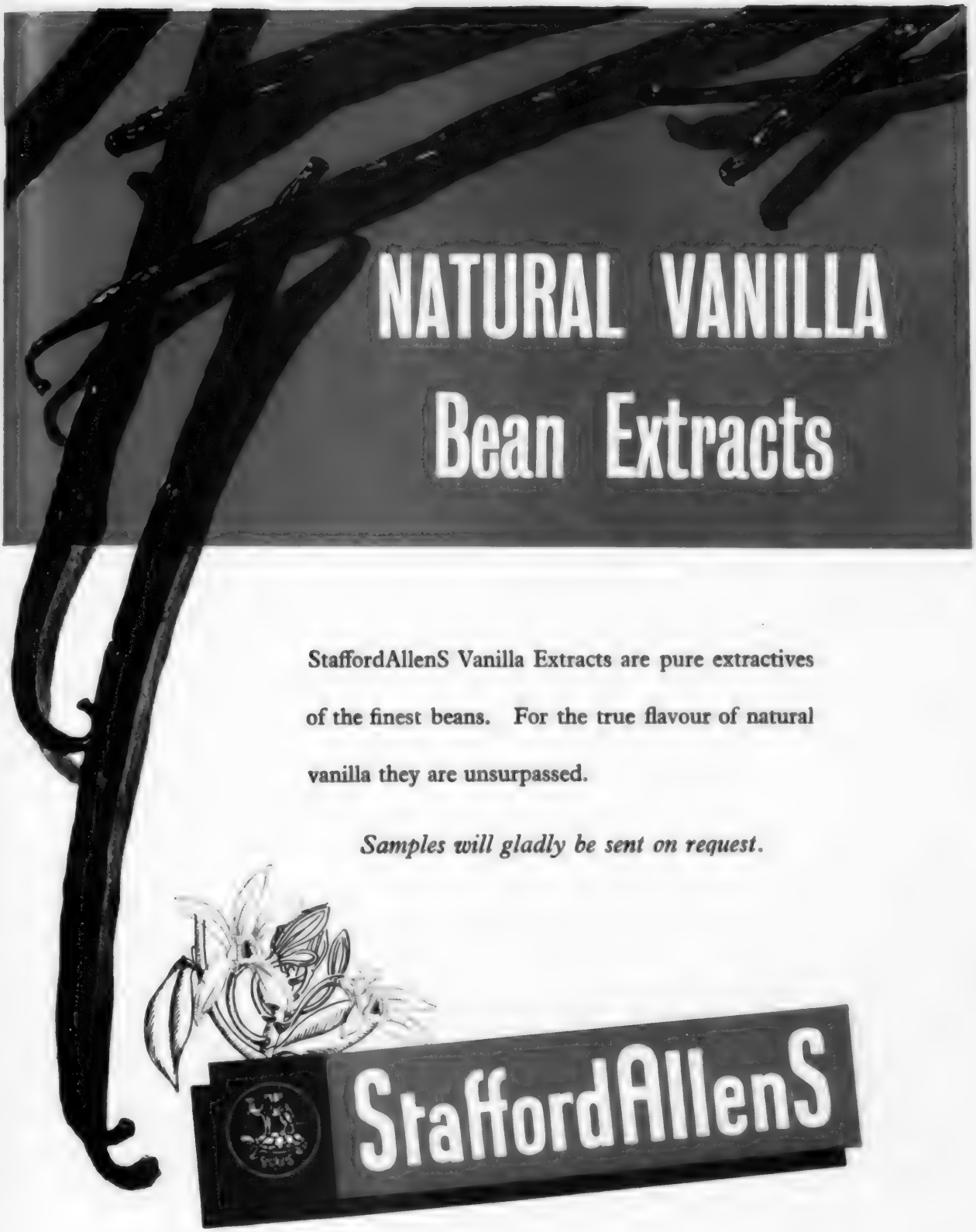

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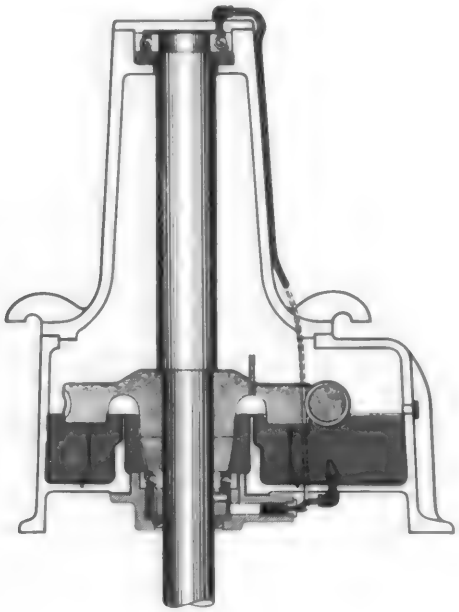

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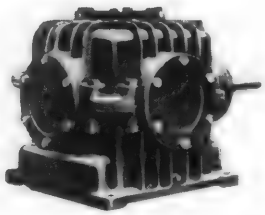

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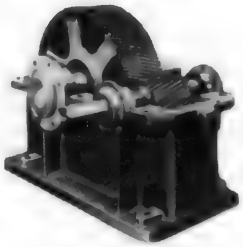

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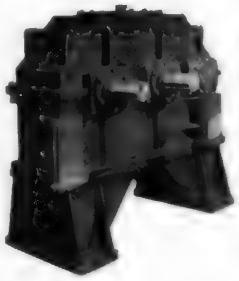

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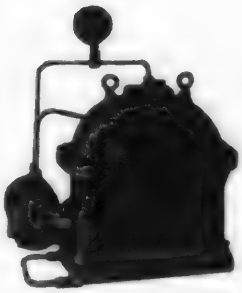

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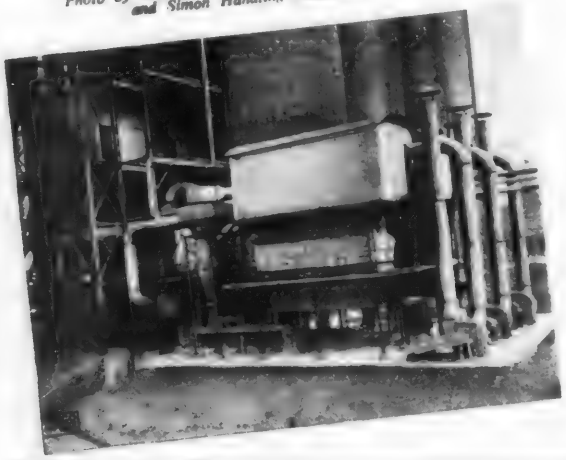

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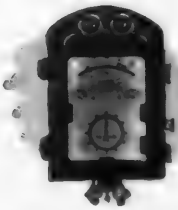

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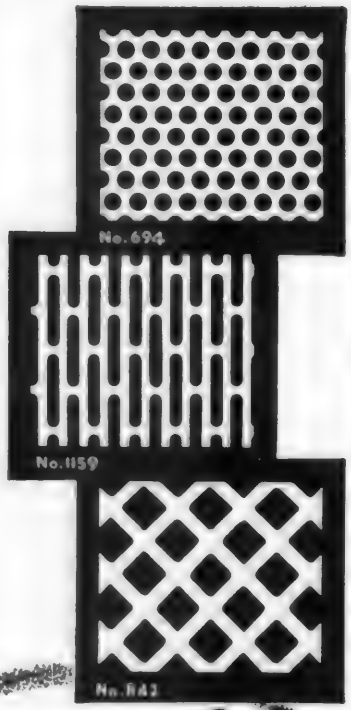

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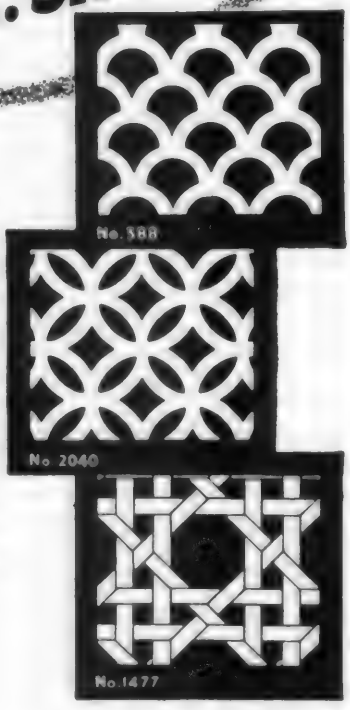

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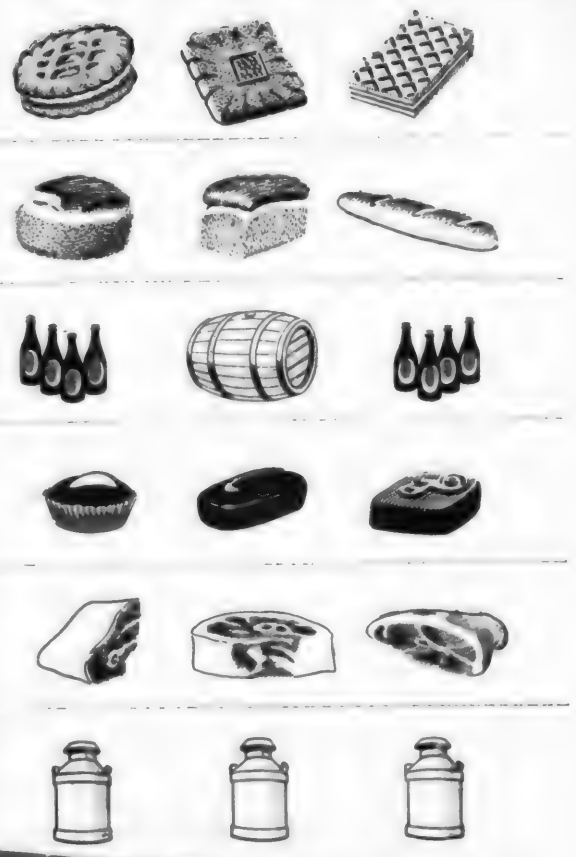

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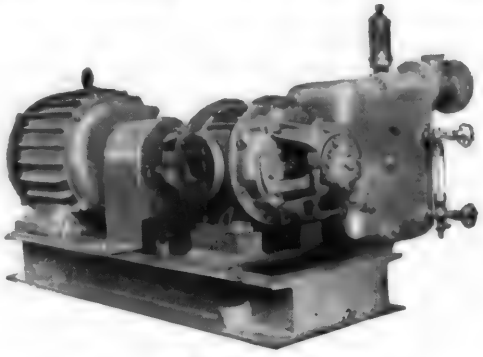

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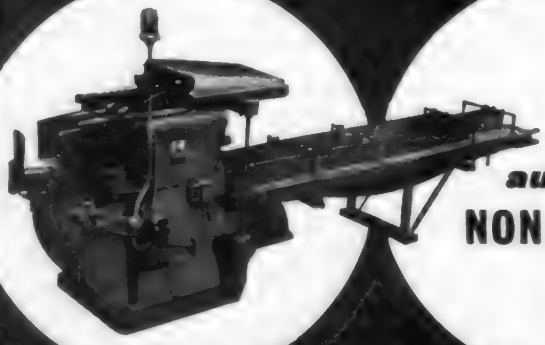

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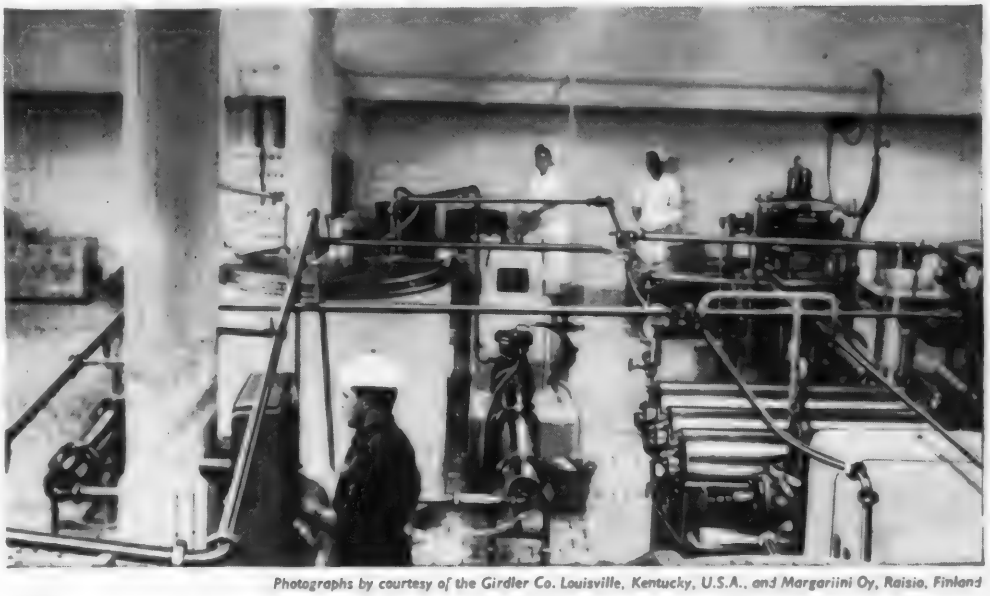

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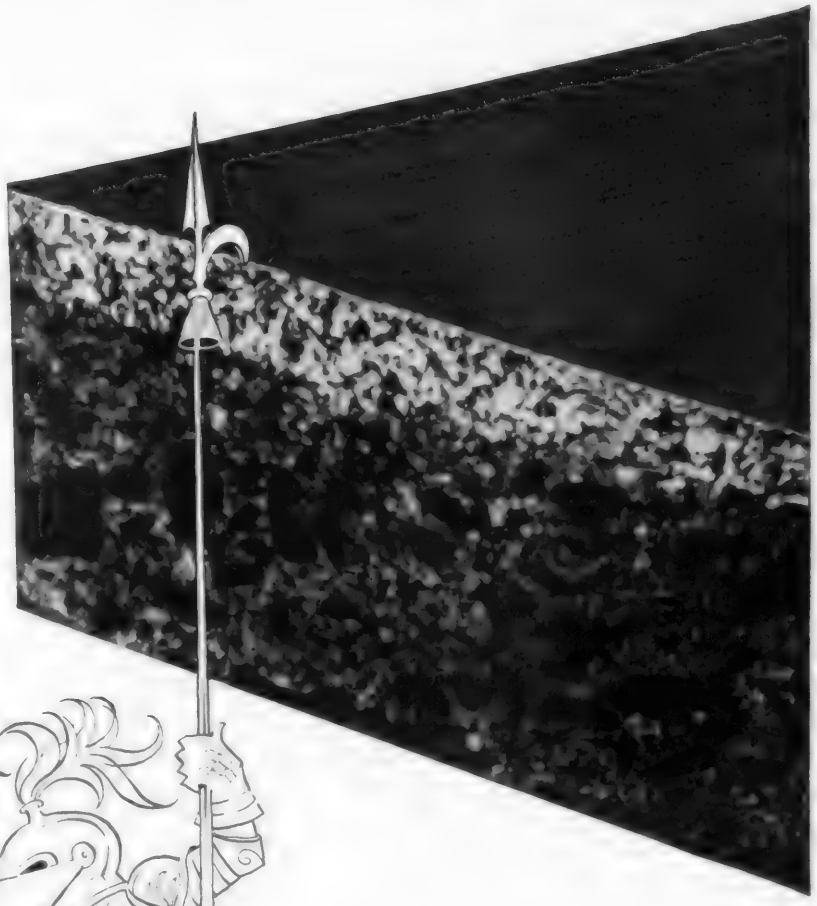

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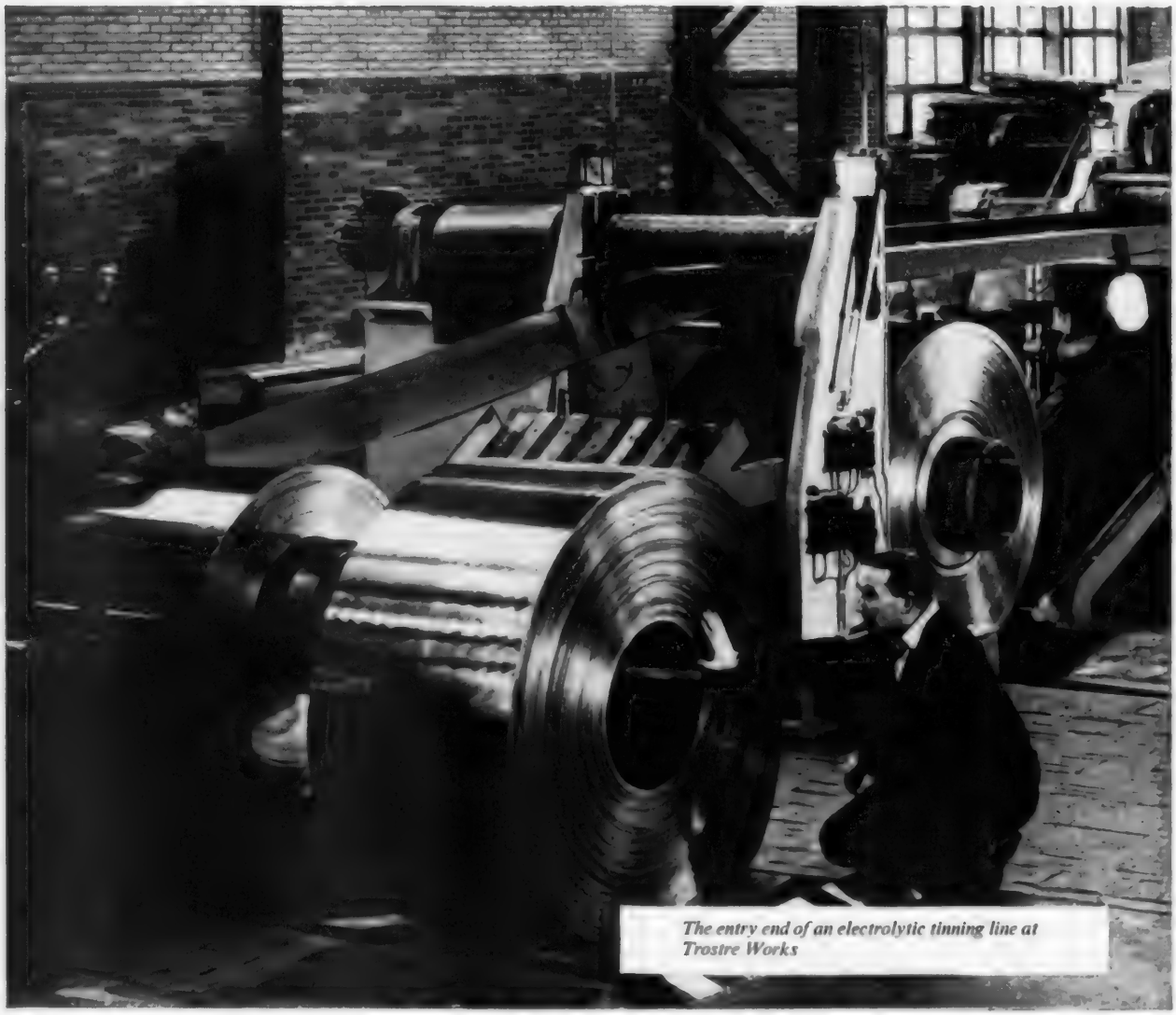
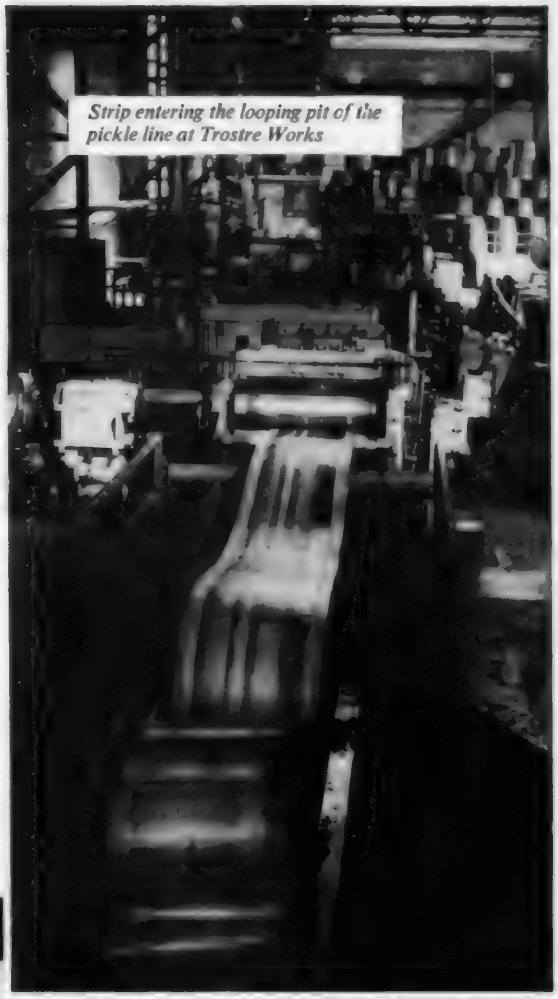


The entry end of an electrolytic tinning line at Trostre Works

Tinned strip entering the cutting and classification section of an electrolytic tinning line



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FOOD MANUFACTURE

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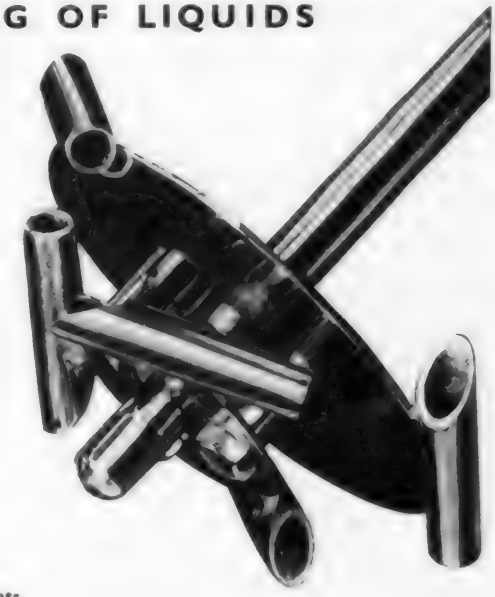

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FOOD MANUFACTURE

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New thoughts on food research

SOME provocative ideas on the responsibilities of food manufacturers for promoting research were put before members of the British Food Manufacturing Industries Research Association by their re-elected president, Professor M. C. Frazer, M.D., D.SC., F.R.C.P., at the annual general meeting of the Association held recently at the Hyde Park Hotel.

Speaking on the subject "Why do we choose our particular food?" Professor Frazer answered his own question by saying, in effect: "We don't." Dealing first with the staple foods, he pointed out that the staples are almost invariably vegetable in origin, mainly starchy, readily available, and cheap. Within these conditions, considerable variety of choice exists, yet we find many people have an almost entirely irrational preference for the staple food which has become traditional over many generations within their own group, and will refuse to alter their eating habits even under the most severe economic and physiological stresses.

Professor Frazer went on to develop the thesis that with other foods also we eat largely what is provided for us, cooked in the way we have become accustomed to, and exert very little control over the overall pattern of our diets. "We eat what we can get; we get what is given to us," he said—the two over-riding factors being availability and money.

Professor Frazer did not attribute this "habitual" pattern of eating entirely to food patterns handed down from one generation to the next, however. He felt that food manufacturers were in a considerable measure responsible for the choice of foods available to the public. "Wheat flour is selected by the millers," he said, ". . . Fresh foods, such as meat, fish, vegetables and fruit, are largely selected by the appropriate industries concerned in their production." Whilst much research goes into the production of varieties which will give better yields or have other desirable commercial attributes, however, the nutritional aspect gets relatively little attention. Great improvements had been introduced in the processing of foods and in the provision of cleaner food, he said, but if the food industry was, in fact, largely responsible for controlling people's diets, this put manufacturers under a heavy obligation. The responsibility was squarely on the shoulders of the industry to ensure, by adequate research, that the changes brought about in foods were entirely beneficial. He suggested that the only way that this could be done was to embark on a really fundamental programme which would elucidate more clearly the essential nature of food and its effects upon the human organism.

Professor Frazer's order is a tall one, for what he was calling for was to all intents and purposes a study of the fundamental nature of the life process itself. Yet he prefaced his general address by pointing out that deaths from coeliac heart diseases increased among the male population from 743 in 1921 to 45,000 in 1956. If this is connected with our eating habits, as there is good reason to suppose that it is, then a more serious approach to the type of basic research advocated by Professor Frazer is clearly overdue, and the food industry will obviously have a part to play in sponsoring it and carrying it out.

Potentialities of the U.S. market

THE United States represents a vast potential market for British manufacturers of speciality foods, if they are prepared to tackle it wisely and energetically. This is abundantly clear from a report recently issued by the export services branch of the Board of Trade, reviewing this subject. The report is a revision of an earlier report issued in 1956, and gives a great deal of valuable information to the would-be exporter to the U.S.A.

The size of the U.S. market has called forth many colourful adjectives, yet one never ceases to be amazed when actual figures are quoted. To learn, for instance, that there are no less than 386,800 retail food outlets, and that sales to the public in 1957 totalled an equivalent of nearly £18,300 million, is itself surprising enough. But when one considers that this market is growing with the population, which is increasing at the rate of two and a half millions per year, and that retail food outlets are rapidly being added to many department stores and other places where they did not previously exist, one realises that the market is still far from being saturated.

The report points out, moreover, that despite temporary recessions the market for speciality foods is increasing with the standard of living of the people. There exist speciality food shops, where imported foods are mostly to be found, but imported foods are being introduced on an increasing scale in supermarkets and chains, and it is here that the really enormous outlet lies. The report gives details of the various outlets for speciality foods, and information on how the different markets might be attacked. It also makes useful suggestions concerning packaging, and outlines the type of advertising and sales promotion which might be necessary.

Perhaps one of the report's most useful contributions, however, is a description of the general ways in which retailers in the U.S.A. receive their supplies, and the channels through which British goods might be accepted. Commissions and mark-ups are also discussed in some detail. Whilst advising personal visits wherever possible, the report also points out that facilities for preliminary surveys of the market are available to British manufacturers through the export services branch of the Board of Trade, working through the Commercial Department of the British Embassy at Washington.

The report contains several appendices giving details of U.S. imports of some speciality foods, rates of import duty, a summary of the Food, Drugs, and Cosmetics Act, and notes on wholesalers, retailers and their associations and on accepted margins of profit. It is well worth the attention of any manufacturer interested in the possible export of food commodities to the U.S.A.

Packaging facilities

THE cause of better packaging of foods and other commodities was given a further fillip recently by the opening of the Packaging Centre in Poland Street, London. The centre is designed to enable manufacturers of packaging materials to stage a permanent display of their products, and to provide a club where everyone interested in packaging can meet, conduct business, and entertain friends. Its opening marks the realisation of a long-standing ambition on the part of its director, Mr. Philip Andrew.

The centre was opened on July 1, by Sir David Eccles, President of the Board of Trade, whose presence reflected the Government's interest in stimulating better packaging of British goods. In his opening address, Sir David remarked that in the field of *haute couture* we had made great advances in the packaging of our most cherished commodity—our womenfolk. In other fields, however, our goods were often less attractively displayed, and if we wished to attract the foreign buyers who were so necessary to our existence, we should have to make ceaseless efforts to maintain a high standard of design and packaging. Even in the home market, Sir David continued, the importance of design and packaging was continually increasing. Children were receiving far more education in the visual arts than ever before, and as these children grew up to become the purchasers of the country, this teaching would have a considerable effect on the products which appealed to them.

The Packaging Centre should give valuable help to the Packaging Institute and the now well-established biennial Packaging Exhibition in assisting British producers to make the most of modern packaging developments, and in enabling British manufacturers of packaging materials to display their goods to the world.

Milk and strontium 90

THE subject of radio-active fallout and its possible hazards is still commanding much publicity, and public confusion is clearly growing rather than being cleared up. This is hardly surprising when the testimony of different so-called experts is so much at odds, and one can hardly blame the public if it begins to doubt the "expertness" of any of the evidence, realising that most of it is based on surmise rather than on fact.

Certainly it appears that we are already in Britain feeling the effects of radio-active fallout more strongly than is generally realised or was ever expected. Recent investigations by Dr. John Fremlin, a nuclear physicist called in by worried Welsh farmers to investigate the radio-activity of their grass, have shown that cuttings from the hills of Talgarth, near Brecon, contain 100 times more radio-activity than is normal. Dr. Fremlin, a senior lecturer at Birmingham University, maintains that there is no danger to water supplies or meat, since the peat of the hills filters the noxious substances from the water, and strontium 90, the radio-active element generally reckoned as being the most dangerous occurring in the fallout from atomic explosions, does not affect meat—which is to say that it does not accumulate in muscular tissue. He admits, however, that milk could be affected if cows were to consume the grass, but suggests that they are unlikely to graze at the altitude (2,000 ft.) from which the samples were taken. He also says that if two-thirds of the radio-activity in the samples already tested comes from strontium 90, then sheep grazing on the land would have in their bones within a year an amount equal to that considered as the limit of safety in human beings.

Moreover, Dr. Fremlin revealed that samples of grass from his own garden in Birmingham had a radio-activity 10 times above normal.

Another controversial angle of the subject has recently developed in Somerset, where Colonel Geoffrey Taylor, prospective Liberal candidate for Yeovil, and a former Professor of Medicine at the University of Lahore and Consultant Physician to the 14th Army, has been addressing audiences on the dangers arising from radioactive fallout. As a result of his addresses, in which he told his listeners that every specimen of British soil, grass, and milk examined contain some strontium 90 from nuclear tests, Colonel Taylor has received letters from the Milk Marketing Board pointing out the disastrous effects which a scare about the radio-activity of milk might have upon the sales of milk and other dairy products. Despite the laudable efforts of the M.M.B. to prevent British farmers suffering as a result of undue public alarm, Colonel Taylor is clearly more concerned with the possible disastrous effects of strontium 90 in the bones of British babies, and is not hesitating to continue his campaign.

And so the controversy rages, with the possible survival of the human race at stake. The subject is already bedevilled enough with uninformed and politically prejudiced comment. Yet when we are faced with the fact that our milk supplies are already detectably affected, and are saved from worse danger only because our cows have no head for heights, we can hardly go on facing with equanimity the possibility that we are being saved from massive destruction only at the cost of lingering decay.

Protein and mental health

THE general value of a sufficiency of first-class protein in the diet of animals and humans has now been appreciated for many years, but certain specific effects of protein deficiency are still coming to light. One such is the effect on mental development. According to work reported recently by two investigators, it may be possible by nutritional means to influence favourably the mental health of many people.

In studies with human beings, doctors at the Ohio State University College of Medicine have shown that pregnant women whose diets are poor during hot weather have an increased possibility of giving birth to mentally defective children. This finding was based on a study of the number of individuals admitted to state institutions between 1860 and 1949. In reporting these findings, the doctors express the belief that the summer heat causes pregnant women to decrease their food intake, particularly of high-quality protein, thus affecting the development of the brain and nervous tissue of the fœtus. They found that hot summers resulted in more mental defectives "to a surprisingly significant degree." It was urged that public health authorities should not wait for further conclusive evidence of the association between diet and mental development, but should take immediate action to improve the nutrition of expectant mothers.

The investigators point out that this question of favourably influencing mental development by improving nutrition is particularly important in underdeveloped countries, especially when, as is often the case, these also have a hot climate.

Fodder from starch waste

IN 1957, a start was made in Holland on the separation of proteins for fodder manufacture from effluents of the potato-starch industry and 400 tons of albuminous products were turned out, 300 tons of which were of excellent quality with a 75 to 80% protein content.

Over a million tons of potatoes are processed into potato starch annually in the Netherlands, the starch content of the potatoes being in the region of 20%. The remainder of the potato, which was formerly carried away with the effluents, also contains highly valuable constituents such as proteins, minerals, sugar and vitamins, and in the post-war years the Netherlands potato-starch industry has vigorously taken up research into ways and means of regaining these valuable constituents from the effluents. As high-grade proteins are much needed and the supply of animal protein such as fish meal and meat meal is scarce, the processing of vegetable proteins of equal value is considered of great importance.

Feeding tests are claimed to have shown that the protein product obtained from the effluent of the potato-starch industry is in no way inferior to animal protein, the main constituents being moisture, 10-12%, crude protein 75-80%, carbohydrates 6-12%, minerals 1·5%, and fats 0·5-1·0%. Chemical analyses have shown that this protein contains the important essential amino acids in sufficient quantities. It has also been proved to contain a great many vitamins, including vitamin B_{12}, which originally was believed to be present only in animal tissues.

Feeding tests on a large scale have been undertaken by the Netherlands Institute for Nutritional Research T.N.O., the experimental station for modern livestock feeding, "De Schothorst," and other organisations. These actual feeding tests gave satisfactory results inasmuch as the potato proved to be better than soya protein and hardly inferior to animal protein. When, in compound feeds, part of the animal protein was replaced by potato protein, the feeding value was found to increase.

If other vegetable proteins, such as soya, were replaced by potato protein, the adding of antibiotics could achieve the same effect without there being any danger attached. The favourable effect of potato

flour was, in the tests undertaken, found to be particularly pronounced with very young animals and its use was given preference in various kinds of meals for young pigs.

As yet only a start has been made on this fruitful method of protein separation from potato starch effluents and research is continuing with a view to processing other valuable constituents from the effluents in order to achieve the greatest possible benefit from the cultivation of manufacturing strains of potatoes.

Rain-making and the law

THE growing ability of meteorological scientists to cause precipitation of rain is bound to have a profound effect upon agriculture in many parts of the world. The process is not without its hazards, however, and recent events have shown that a number of legal niceties may be involved. For this reason, the Australian Commonwealth Scientific and Industrial Research Organisation is conferring with the country's Attorney-General on the legal aspects of rain-making.

The conference follows experiments by C.S.I.R.O. radio physicists, whose attempts at rain-making have twice within the last year met with dramatic success. In December last they created 20 storms from their planes, each 10 miles across, and produced falls of up to 20 points in two areas of New South Wales. In January, three men were nearly drowned and a utility was swept away in a flood caused by rain-making experiments in Queensland.

Several legal points arise from these events. What would happen, for instance, if heavy rain fell on the property of a landowner who did not want it, involving him in material losses? Who would have been responsible if the three men had been drowned? Could their relatives have sued the C.S.I.R.O., the Mary Kathleen Uranium Co., which sought the rain-making attempt, the Queensland Government, or the Australian Government? These points were raised by Professor G. Sawer, Professor of Law at the Australian National University, who pointed out that legislation was needed immediately to protect not only the rain-makers, but also those on whose property the rain fell.

Under common law, he said, a landowner owns the "superincumbent column of air" rising above his land to the limits of the atmosphere. The Australian Government has made statutory exception to the private ownership of air to prevent action for trespass being made against airlines, but they have been held to be liable for anything falling from a plane and causing damage. Therefore the assumption is that if a rain-maker caused rain to fall which damaged a farmer's property, he would be liable.

Britain in Europe, Ltd.

SUPPORTERS of the movement for the closer integration of British trade with that of the rest of Europe have taken another step towards furthering their aims by the formation of a new organisation, the Britain in Europe Committee. This has been incorporated as a company limited by guarantee, and its main function will be to undertake or sponsor original research on European economic integration, and generally to stimulate interest in Britain's participation in the proposed European Free Trade Area. To this end, the committee will provide specialised information and documentation on European economic integration, besides initiating or supporting courses, lectures and meetings.

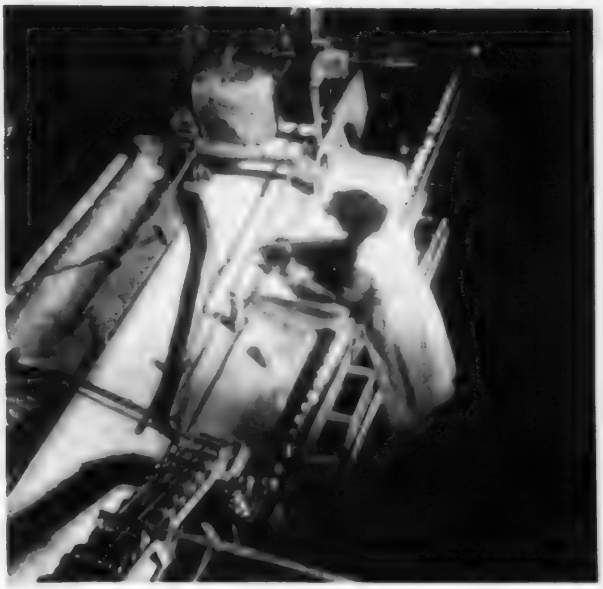
The committee will meet under the chairmanship of Sir David Kelly, and members with an interest in the food industry include Sir Harry Jephcott, chairman of Glaxo Laboratories, Mr. Lloyd Owen, chairman of Rowntree's, and Mr. John Ryan, vice-chairman of the Metal Box Company.

Can sizes

ORDER out of chaos is never easy to create. On the question of can sizes, it has taken Technical Committee 52 of the International Organisation for Standardisation 10 years of striving to reach agreement. At a recent plenary session of the Organisation at Harrogate, this committee agreed on the terms of two draft recommendations, one for ranges of nominal capacities and diameters of tins for milk, the other laying down a set of 18 ranges of cans for such products as meat, soup, fruit, and vegetables.

The draft recommendations agreed by the committee are designed to simplify international trade, to reduce misconceptions between buyer and seller, and ultimately to safeguard the interests of the ordinary shopper, and they represent an important step forward in the international standardisation of food cans. In each instance the committee set out nominal capacities, in millilitres, together with a permissible percentage deviation which, though wide enough to allow for variation in the density of different foodstuffs, are close enough to ensure that all cans in a given range may be regarded as "commercially similar" in content. The recommended system is for a number—*e.g.* "12"—to indicate the nominal capacity—in this case 850 ml.

The Organisation is well supported by members representing various interests in the British food industry, and it is to be hoped that its findings will be widely adopted. Otherwise, with yet another system of can sizes on our hands, we shall have not order but confusion worse confounded.



Left: **Peach pitters at work stoning the fruit.** *Right:* **A woman packing "local" peas. The same line is used for packing the choicer grades of fruit.**

Fruit Canning in Victoria

By L. B. Scott

Having recently completed an extended tour of the fruit growing areas of Victoria, the author of this article describes some of the techniques he saw used for processing the fruit, and gives his impressions of this branch of the Australian food industry.

LITERALLY millions of cans of Australian fruit are sold in Britain every year. Records show that whereas in 1926 the exports amounted to 200,000 cases, by 1955 they had risen to the very high figure of 4,500,000 cases, and there are no signs of any slackening.

Australia sends us pineapples, apricots, pears and peaches, with smaller quantities of cocktail and "two fruit" packs.

Between forty and fifty canneries now operate throughout Australia, but in this article only the methods used in Victoria will be considered.

Apricots

These are canned on a much smaller scale than the other fruits mentioned, partly because of lack of demand, and partly because very much more hand labour is required. Wage rates are relatively high in Australia, and possibly until such time as apricot canning can be mechanised there may not be any large-scale production. What packing is done generally takes place during the first 3 weeks of January.

Peaches, pears

The seasons for these generally overlap, with pears being ready at the end of January; the peaches mature 2/3 weeks later. Because of this overlap most factories are geared to cope with both fruits at the same time. During the period from the end of January to the beginning of May, thousands of people are engaged in the industry, and at the end of the season the machines are stripped and overhauled ready for the next one.

Federal inspection

Every factory in Australia which exports canned fruit comes under Federal supervision all the time the factory is working, and even when the fruit has been safely canned and stored, a further inspection is made before an export certificate is granted. Several inspectors are stationed at each factory, and working to standards laid down by the Government these inspectors see that the consumer is protected so far as weight and quality is concerned. If, in the opinion of the chief inspector, the goods packed are not up to the standards laid down, he has the authority to reject the pack for export purposes, and he therefore carries full responsibility for ensuring that export packs conform in all details with the standards laid down.

A lorry load of peaches at Yoozali near Griffiths.

Pear canning

The type of pear canned is the Bartlett, though a few Packhams are also packed in order to prolong the season.

These pears are grown in vast quantities in the Golden Valley, a rich and fertile area, the fringe of which is about 112 miles from Melbourne. Many large firms operate around Shepparton, Kyabram and similar places, all within easy reach of the supply, and in addition several canneries operate around Melbourne itself.

Between them the canneries handle thousands of tons of pears, and possibly 70% of their packs will be consumed in British homes before the end of this year.

The pears are harvested when they are fully matured, but still green and hard. Some use of the penetrometer is made by the growers to determine the correct stage for picking, but years of experience gives them a very close idea.

As was mentioned earlier, the season starts about mid-January, and from then on, the canneries work flat out in trying to cope with supplies. As they cannot hope to cope with them without storage of some sort, great use is made of cold stores, practically every factory having enough cold storage space on its premises to deal with all its requirements. The provision of these storage facilities is naturally only economical for large concerns, and individual factories do, in fact, tend to be very large.

The pears are always delivered to the plant in lug boxes, each holding about 48 lb., but each factory has its own method of dealing with them. Some grade for size immediately on arrival, and others prefer to put the fruit into cold store to be graded at a later date. The storage temperatures used differ from place to place, but are generally within the range 30-34°F.

All processors agree, however, on the necessity of the pears being cold stored for at least 1 week before being removed to the ripening rooms. This minimum period, in addition to ensuring the absence of grits in the pears, also promotes even ripening later on.

The canneries try to deal with their pears in rotation, so as to avoid too long storage before canning and avoid the damage which can be caused to the cells by long exposure to low temperatures.

After being held in cold store for the prescribed period, the pears are moved into the ripening chambers. These units can hold anything from 6,000 to 10,000 boxes, and there are several in each factory.

As soon as the unit is filled, the heat is turned on, the air is kept moving, and the pears are held for at least 4 days at a temperature of 68°F. As soon as the pears have ripened enough to process, the temperature is reduced to between 40° and 45°F., which keeps the pears in perfect condition for peeling.

Extensive use of fork lift trucks and pallets is made in this operation, but in one plant a unique system of conveyor belts is used to empty the chamber. In this plant the boxes are hand-stacked 7 high when the chambers are filled, but the stacks are broken down when the pears are ready for use. Every box is inspected before

A view of the pear peeling line. The peeled pears are in the centre and the waste in the bottom.

A view of the peach inspection belt.

being placed on the conveyor belt, which delivers them to the peeling machines, a distance of some 100 yd. At the machines, the boxes are automatically dumped, self righted, then carried on by conveyor to the empty box department. This method ensures that no backward fruit arrives at the machines, whereas the block stack method is suspect in this connection.

Peeling

Every factory has batteries of American peeling machines, and usually each battery is set up to peel a pre-graded size of pear. The size grading is therefore a very important process, as correct grading leads to greater yields per ton, and to better size grading in the cans.

These machines, which operate at a speed of about 48 pears per min., peel and core the fruit and remove the stem and calyx. They have generally been found to be very efficient.

A new machine has been tested this season, however, and high hopes are entertained for it. Whereas the older type machine uses cutting blades, the new machine removes the skin by an abrasive action. As it follows the contour of the pear, a much better shape is achieved, and it is claimed that yields will be greater, and that labour will be saved in after-trimming. One disadvantage noted was the greater tendency to discoloration or oxidation, but this difficulty will no doubt be overcome. At least one factory has already decided to change over to the new machine next season.

On leaving the peeling machines, the pears are passed over a shaker washer, where the adhering cores are rejected and the pears receive a light rinse with dilute brine. They then go on to the inspection belt where such halves as may need more trimming are diverted to the trimmers, whence they join the main stream and arrive at the filling end of the conveyor.

Filling

For both pears and peaches, two can sizes are used—No. 1 Tall (16 oz.) and A2½ (30 oz.) Different methods of filling are used, varying from direct ploughing into the cans to hand packing, either off the belt or by what is called the "slit method." In earlier years, all pears were hand packed, and experienced packers could earn up to £20 per week on piece work. This method has been largely replaced by the slit method.

For this method, slits holding six 30 oz. cans are fixed at about 3 ft. intervals down the length of the conveyor. These are fed by tracks from the main can-delivery line, and are so placed that the tops of the cans are level with the conveyor belt. This arrangement greatly facilitates the rapid packing of the cans with minimum handling of the fruit pieces. Disadvantages are that experienced packers are required, and that the cans have to be transported in trays from the packers to the filling machines.

The latest improvement of the method is to have the slits extending the whole length of the conveyor in the form of a separate chain conveyor which is pedal-operated by a woman at the end of the line.

Some factories pack four grades, *i.e.* Fancy, Choice, Standard and Local. As the pears pass along the belt the first two or three packers pick off the best quality, which are pears without any blemishes or residual cores, and of similar size. These can either be Fancy or Choice depending on the syrup added. Fancy grade fruit is packed in syrup of 35° Brix and choice grade in syrup of 30° Brix.

Selection is then made of Standard grade fruit, which is filled farther along the belt into cans running alongside the conveyor at a lower level. Standard grade packs contain syrup of 20° Brix.

Fruit with too many blemishes is left on the belt until the end, and is either packed for local trade or, more often, diverted to the dicing machines for use in "two fruit" packs after removal of the offending blemishes.

In each case, the cans are filled to capacity without the fruit being in any way damaged by crushing. Cans are not normally weighed on the line, but one operator is continually engaged in check-weighing. In addition, the Federal Inspectors check both fruit weight and net weight, together with syrup densities at time of fill.

Peach canning

Since peaches mature over a much shorter season than pears, canneries are mostly working to capacity during the harvest period,

but some tend to ease off a little once the flush is over, and regulate their production to the amount still in the cold stores.

The cold storage of peaches is something of a problem, as the fruit does not hold up much longer than three to four weeks. The peaches seen came from the Golden Valley and Griffiths, an irrigation area of New South Wales. Various types are produced, but in the main they are confined to Phillips, Golden Queen and Pullars.

On arrival at the factory, the peaches are put over the first inspection belt, the ripe ones being allowed to go on, and the semi-ripe taken off. Occasional green ones appear, but they too are removed for further treatment. Fruit unsuitable for canning is diverted to jam making.

Fruit which has to be stored for use later on is placed in cold stores at temperatures of 30°F., as it has been found that this gives a better product than fruit stored at 32°F.

Peach pitting

After passing the first inspection belt, the peaches are conveyed to batteries of American-type pitting machines. These machines are very effective, the fruit being split and the pits removed by the same machine. One female operator places the peach on a roller conveyor, and the fingers of the machine pick it up, regardless of size, and place it in the arms which keeps it in position whilst the saw cuts through it. Immediately following this, two blades cut round the pit, thus removing it from the flesh, and the two halves fall on one conveyor, whilst the pit falls on to the waste conveyor. From this pitting machine, the halves travel on another belt where they are inspected for unsatisfactory pitting, any such peaches removed for re-pitting, either manually or by machine.

Lye peeling

Before entry into the lye peeler, the peaches pass over a shaker which turns the cut side downwards, thus allowing the lye to work on the skin. Leaving the peeler, the fruit passed under a rinse, which removes all traces of lye. Several inspections follow this operation, and again use of "shakers" is made. The halves are turned upward on one belt and downward on the next. By this method it is simple to reject fruit with blemishes either on the skin or in the core centre.

Grading

The next operation is that of grading, and this is most important. As the slicing machines are set up to deal with specific sizes of halves, it is important that the proper sizes are selected. The grading machine is similar in construction to a pea grader, but with very much larger perforations, and on a horizontal plane rather than being cylindrical. Peaches having a diameter of less than $2\frac{3}{8}$ in. are ploughed off for canning as "halves," whilst the larger ones are delivered to the slicing machines. By far the greater proportion of peaches are produced as slices, and these have proved very popular with the British housewife.

Slicing

The slicing machines are also of American design, though some of them are made in Australia. Unlike some of the small slicers seen in this country, these machines are very high capacity units. The peach halves are fed in automatically, after passing over a machine with fingers which turns the fruit in the proper position for slicing. Depending on the grade of slice required, the machine can be set to deliver either five or seven slices. Large circular knives offset from the centre do the actual cutting, and the slices are deposited on a conveyor belt which is in itself a further grader, as it is so split that the main slices travel down the centre of the belt, whilst the off-cuts are ploughed off at the sides.

The slices are then carried on an inspection belt leading to the filling tables, and in the process are examined by women looking for defects that may have been passed earlier or have been caused by the slicing machine itself.

Packing

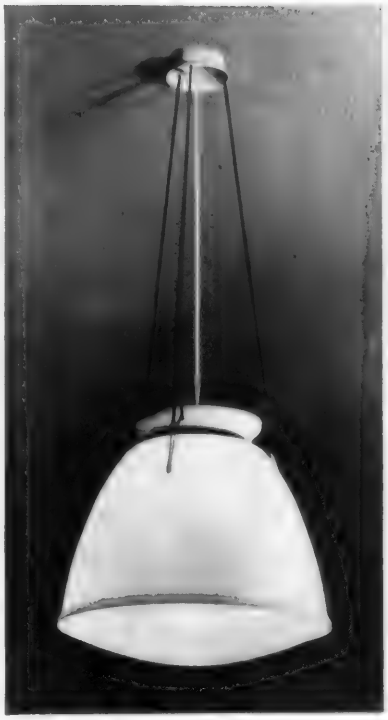
All grades are packed either manually or by machine. In the manual method the peaches are delivered to filling tables having cans running parallel with, but lower than, the conveyor. These tables vary in design, but mostly follow the same principle. In the machine method, the slices are either conveyor-fed or water-flumed to hoppers, which are set on top of fillers not unlike pea fillers. Speeds of 120 cans per min. are reached with this method. The filled cans are then conveyed to the syruping machines and thence on to the closers. Syrup strengths of 45°, 35° and 25° Brix are used for Fancy, Choice and Standard grades respectively.

After being filled the cans are conveyed to the syruping machines, and then to the seamers. Some factories use exhaust boxes, but a number use vacuum seamers. Many of the closing machines operate at up to 140 cans/min.

Cooking equipment ranges from open tanks to modern retorts with facilities for cooling the cans, and cooking times and temperatures vary with the type of equipment. In equipment operating at 212°F., 16 oz. pears were generally cooked for between 16 and 20 min., 30 oz. cans receiving a 24 to 32 min. cook. With peaches, 16 oz. cans were cooked for between 20 and 24 min., and 30 oz. cans for 30 to 35 min. These times are reduced appreciably for pressure retorts.

Labelling is not done straight from the coolers, although permission for the adoption of this practice has been granted this year. On leaving the coolers the cans run down conveyor channels, from which they are lifted manually by a clamp device. They are then stacked on pallets with a layer of stiff paper between each row for transportation to the labelling department.

Before the cans are labelled, a further check is made by the Federal inspectors, and if they are found to be satisfactory an export pass is granted. Labelling departments are in general well equipped, having faulty-can rejectors, case packers and compression units.



INDUSTRIAL LIGHTING EQUIPMENT

A "FOOD MANUFACTURE" SURVEY

LIGHTING is an important factor in efficient industrial activity of all types, and although it is probably true to say that no manufacturer of lighting equipment has designed fittings with the needs of the food industry exclusively in mind, many have been conscious of these needs and have sought to cater for them. Thus we have lighting equipment which is vapour-proof, for use in jam-boiling rooms and other areas where large amounts of steam are generated, fittings designed to eliminate the collection of dust, and devices specially adapted to prevent the danger of broken glass falling into food products in the event of elements fusing.

We give below a description of some of the modern lighting equipment now available, much of which features these special applications to the food industry.

Fluorescent and filament lamps

The industrial lighting equipment manufactured by Crompton Parkinson, Ltd., ranges from the simplest batten-mounted single fluorescent tube—which can be fitted with any up to 400 combinations of reflector and diffuser elements—to spot lamps and general service lamps for floodlighting.

Shown in the manufacturer's booklet "Crompton Lighting Fittings" are 16 different classifications of industrial/commercial fluorescent lamps and fittings, 17 types of filament lamps and fittings and five types of electrical discharge lamps.

Lamps, of ratings 20 w.-80 w. can be supplied in 2 ft., 3 ft., 4 ft. or 5 ft. lengths in any of five colours, *i.e.* warm white, de luxe warm white, daylight, natural and colour-matching.

Reflectors are available in closed or open ended form in metal, opal plastic, translucent plastic and heavy duty vitreous enamel.

Special purpose vapour-proof fittings are available for locations where very corrosive vapours are present in fairly concentrated amounts or where excessive dust or non-explosive chemical powders are present. All *Industrial Flameproof* Crompton Parkinson fittings carry the appropriate Buxton certificate.

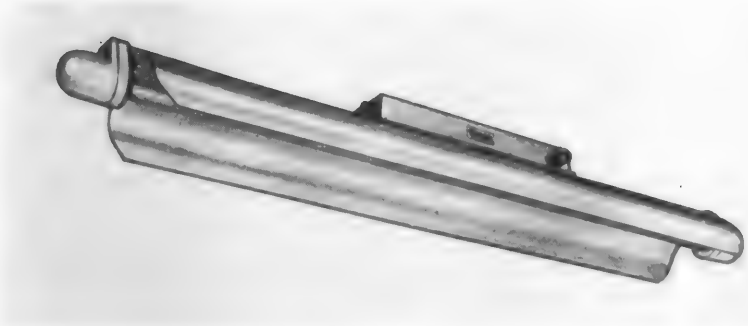
Above: **Corrosion-resistant light fittings by G.E.C. On the left is a fitting for tungsten lamps, and on the right one for fluorescent tubes.**

These fittings can be supplied with a clear "Perspex" tube which totally encloses the lamp, thus removing all possibility of glass falling into edible products in the unlikely event of the lamp bursting.

In all the fluorescent, spring-loaded lamp holders allow rapid insertion or removal of lamps from either end of the fitting, and reflector panels can be quickly removed without tools when cleaning is necessary.

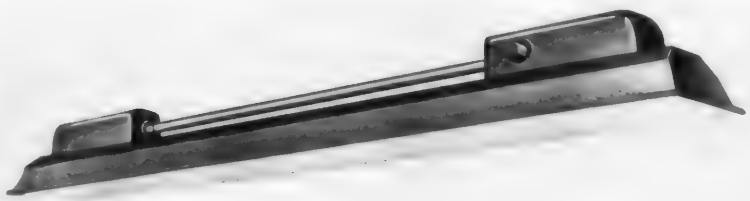
The Crompton *New Line* trunking associated with these fittings is described as self-aligning, adaptable, speedily installed, and easily maintained, and it can be suspended, even when fully loaded, from points up to 15 ft. apart.

One of the most recent developments in the manufacture of high wattage lamps intended for areas where food is being prepared is a safety device which prevents the possibility of lamp shattering at the end of its life. A circular platform of transparent material is inserted in the lamp during manufacture and, being free to move, the platform always assumes a horizontal position beneath the



Left: **The Crompton Parkinson vapour-proof fitting type AV 1114 with a reflector of white PVC.**

Below: **The Benjamin Heavy Duty Flurolier fitting is designed for local or general lighting in atmospheres containing dust, fluff or other fine particles.**



filament. Thus, if molten metal falls from the filament, the platform provides absolute protection for the glass bulb.

Benjamin Electric, Ltd., manufacture suitable lighting fittings for many factory requirements, the majority being finished in *Crysteel* vitreous enamel—an exclusive product which provides the hard, smooth surface used for Benjamin reflectors. This is claimed to be superior to ordinary vitreous enamel, and to have the highest reflection factor of any vitreous enamel obtainable.

The *Flurolier* fluorescent fitting is used in a great many lighting installations for food manufacture, and Benjamin supply a complete range of these fittings. They are available in single or continuous runs, with or without top light facility, and include a wide variety of fixing arrangements. Lampholders are said to be of novel design, and reflectors are easily detachable for cleaning. A variety of fittings is thus available with which to plan practically any lighting scheme.

Of particular interest is the *Heavy Duty Flurolier* fitting, which has internal wiring, while the gear and contacts are effectively sealed off so that dust cannot penetrate between the heavy brass lampholder and the lamp. This fitting takes any standard Benjamin reflector for single 80 w. 5 ft. tube.

In addition to these *Crysteel* vitreous enamel fittings, *Flurolier* fittings can be supplied for use where conditions are reasonably clean and dry in *Peropal* finish, which is obtained by a new technique in high-temperature stove enamelling.

In the Benjamin tungsten range all types of reflectors are listed, including dispersive, concentrating, corrosion-resisting and angle units. The firm also supply a range of visor covers for most of their reflectors which exclude dust and dirt. These are available in clear plastic, and are recommended for use in the food industry in areas where the breaking of a lamp, unlikely as this might be, might cause contamination of food products.

Non-corrodible fittings

Special fluorescent and tungsten fittings for applications in which a non-corrodible fitting is essential have recently been introduced by the General Electric Co., Ltd., with the demands of the food industry especially in mind. They have been designed to eliminate all possibility of rusting, and the use of any kind of paint is avoided so as to remove the danger of flakes of corroded paint falling into foodstuffs.

The G.E.C. F62107 twin 5 ft. fluorescent fitting has a complete *Perspex* enclosure, the lower surface having corrugations in which the fluorescent tubes rest. This ensures that the brightest parts of the enclosure are the corrugated seatings, and that the maximum of light is given in a downwards direction. Access for relamping, for the changing of gear and for wiring is from one end of the fitting, where the end cover is fixed by a single captive knob. Special section gaskets ensure a vapour-tight-closure.

The F64532 200 w. and F64533 300/500 w. tungsten fittings are also completely corrosion proof. In each fitting the main lamp housing is of *Perspex*, the ceiling plate is of rigid P.V.C., and the suspensions are of Terylene cord. There are no external metal parts. The sealed-in cover is made in clear pin-spot *Perspex* to give the maximum light output downwards.

Bi-pin fluorescent lighting

A range of adaptable and easily installed fittings suitable for industrial users is made by Philips Electrical, Ltd. The units are said to be easily mounted, in that the electrical unit may be connected and mounted first, the reflector and other parts such as endplates and louvres being added later as required. Special features are said to include a detachable reflector, spring-loaded, shock-proof lampholders, and the sound positioning of the starter, and these features are said to ensure

safe and easy maintenance. The new Philips totally enclosed Polyester canned ballast is fitted, and this is claimed to be silent and cool in operation. Lamp holder positioning enables *Reflectalite* lamps to be used, and the fittings can be mounted in continuous rows with virtually no breaks in the stream of light. Traditional suspension methods—rod, chain, or catenary wire—may be employed.

The *Reflectalite* fluorescent lamps are provided with a built-in reflector designed to obviate light wastage through the accumulation of dust and dirt and to give extra light in the most useful direction. The lamp has nearly $\frac{2}{3}$ of its inner surface—that segment where dust and dirt most easily settle—coated with a special powder prior to the application of the normal fluorescent phosphor, and the majority of light is therefore reflected downwards through a 130° window.

The pastry department at the bakeries of Squires and Kinton are fitted with Crompton Parkinson A011 fittings carrying 80 watt lamps.

Sheet steel fittings

The *Cryselco* range of fittings, made by Cryselco, Ltd., is constructed from high-grade sheet steel and subjected to a thorough rustproofing process before being finished in white stove enamel. The firm recommend their trough reflector as being the most suitable fitting for industrial use. The reflector acts as a cut-off to the bare lamp at normal viewing levels, as well as ensuring a maximum of light in a downwards direction. Slots can be provided in the reflector to allow a certain amount of upward light, which obviates the dark tunnel effect in the area over the fitting. Maintenance is made easy by a simple method of removing the reflector for cleaning purposes.

Benjamin Flurolier fittings installed in the butchering department of Hughes Bros. (Manufacturers) Ltd. The almost complete absence of shadow makes for easy cutting.

Cable trunking

Cryselco also manufacture industrial trunking for lighting fittings. The simple assembly and erection methods employed do not necessitate the use of skilled labour, and it is claimed that two men can handle either 12 ft. or 18 ft. lengths with ease. A system of T, crossover, and right-angle bends and risers can be supplied where immovable obstacles have to be circumvented. The fittings can be moved along the trunking by the simple loosening of two screws, and plates carrying socket outlets can be fixed to the underside of the trunking by means of the standard support plate.

An overlap method of construction ensures a rigidity which allows the trunking to be suspended from fixings up to 18 ft. apart, and use can be made of the internal section to act as cable trunking which can be brought down walls from the overhead section. Other services can also be carried in the internal ducts, and it is claimed that although the trunking may be greater than that of conduit its adaptability and the saving it effects in labour costs will more than offset the extra expense.

Low cost of erection is also claimed as one of the advantages of *Sieline* continuous lighting trunking, made by Siemens Edison Swan, Ltd. The trunking is

A daylight view inside a factory equipped with Siemens Edison Swan light trunking, which is finished with Epikote enamel.

The Preston fluorescent light fitting needs no fixing as it can simply be plugged into a standard bayonet socket.

delivered in an advanced state of prefabrication, and a high degree of flexibility of installation is claimed. The trunking is finished with an epoxy resin enamel known as *Epikote*, which is of special interest to the food industry in that it is said to be tough and chemically stable, and to have excellent adhesion properties.

Colour comparison

It is often difficult for manufacturers to ensure standardisation of the colour matches of their products, made at different times and sometimes even in different factories. Exact colour matching under the eye of a skilled inspector demands a suitable illuminant, since the apparent colour of an article is determined in part by the colour rendering quality of the light falling on it. Daylight in this country varies so much in its intensity that it cannot be regarded as ideal for the daily examination of colours, and some means of providing artificial illumination of the right type is therefore necessary for standardised colour comparisons. A great deal of research on this question has been carried out by Siemens Edison Swan, and the results are embodied in their industrial colour matching unit, an account of which is available from the firm in leaflet form.

Local lighting

Whilst levels of general lighting are important for the maintenance of industrial efficiency—and they are reported to have increased throughout British industry by as much as 50% since the end of the war—there are many instances in which the careful siting of local lighting can increase the efficiency of certain operations even further. Linolite, Ltd., have specialised for many years in this question of local lighting, and they offer a range of fittings for this purpose. Types FK and FL *Linora* small-sectioned fluorescent reflectors enable fluorescent lamps to be used for local lighting, 18 in. 15 w. and 24 in 20 w. lamps being mainly employed. A variety of brackets can be fitted for specific purposes.

The *Spotline* adjustable reflector, which is available for 18 and 24 in. lamps, is also marketed by the same firm. This unit has three-point adjustment, which allows the angle of the light to be varied to suit the convenience of the operative.

Linolite fittings also find a wide application in the illumination of instrument panels, switchboards, etc., and they are extensively used over wash-basins for which purpose a range of all-insulated fittings is available.

Plug-in fluorescent lights

A fluorescent light fitting which needs no attachments, but simply plugs in to a standard bayonet socket, has been developed by Preston Industrial Research. The largest fitting weighs under 3 lb. and can therefore be hung on ordinary light flex. Casings are of aluminium, stove enamelled, and there are no end plates, so that lamps can be changed without trouble. The fitting may be taken down for cleaning simply by unplugging it like an ordinary bulb.

Several fittings are available in the Preston range, including a 4 ft. single batten, 2 ft. and 3 ft. twin battens, a 2 ft. twin reflector fitting, and 2 ft. and 3 ft. single reflector fittings. As well as being suitable for general lighting in certain areas, the lamps have obvious applications for local lighting, especially when this may be of a temporary nature, or where it is required to move lights from one point to another.

Adjustable light fitting

Light fittings with a variety of applications in the food industry are also made by Troughton and Young (Lighting), Ltd. Their U.43H. fitting was originally designed for diagnostic work, but has special applications in the processing of meat, as for instance in the examination of carcases on the dressing line. The fitting is available in two models with different extensibilities, maximum extension being 4 ft. 11 in.

Model T. 523/P2, made by the same firm, is a fluorescent light fit-

The U.43.H. light fitting, made by Troughton and Young Ltd.

ting which features easily removable side plates which can be taken down for cleaning. The fitting can also be arranged in continuous lengths if required. The firm also make several ranges of glassware fittings for tungsten lights. Their U.202 fitting is open at the bottom, so that insects and dirt cannot collect, and re-lamping can be carried out without removal of the glass. The A.521 model has similar provisions, but is fitted in addition with a toggle mechanism which allows the glass to be removed for cleaning without the use of tools.

Lumenated ceilings

The *Lumenated Ceiling* lighting system, manufactured by Lumenated Ceilings, Ltd., is claimed to have been the first of its kind to be introduced in this country. The basis of the system is a false ceiling of corrugated translucent vinyl plastic plates supported in a light-alloy framework suspended below fluorescent tubes. The *Lumenated Ceiling* diffuses illumination evenly over a wide area, without glare, highspots or shadows, and appears in effect to be the source of light. It is claimed to be the nearest approach to natural light yet devised, but the cost is said to be comparable with other types of "overall" lighting systems and in many cases to be considerably cheaper.

The ceilings are particularly useful where a large factory area has to be illuminated, as they can provide overall wall-to-wall lighting or, alternatively, they can have surrounds of hardboard or other panelling. Small panels can be used for suspension under single or multiple tubes to give localised lighting.

A recent installation in the cheese factory of Aplin and Barrett, Ltd., was mentioned in a previous issue (FOOD MANUFACTURE, 1957, **32** (10), 453 (October)), and illustrates some of the advantages of the system. The structural ceilings in the cheese cleaning, grinding and packing rooms are barrel-vaulted, and were difficult to maintain at the required high standard of cleanliness. The erection of a *Lumenated Ceiling*, however, obviated this difficulty and also lowered the effective ceiling height so that the amount of space to be heated in the winter was reduced appreciably. The false ceiling provides good insulation, so that the treated rooms are effectively warmer in winter and cooler in summer. The appearance of the factory is enhanced as all pipework and other services are installed in the cavity between the true and false ceilings, so that they are not visible from the factory floor.

Part of the factory of Aplin and Barrett Ltd., at Westbury, Wilts, where a Lumenated Ceiling has been installed.

Lumenated Ceilings, Ltd., recently introduced a variation on the system known as the *Lumenator Module*. The basic principles are the same, but the false ceiling consists of plastics panels each two-feet square, supported in special aluminium tracks. The system is extremely flexible as an infinite variety of layouts are possible by the incorporation of two-foot square panels of hardboard, or acoustic tiles, in combination with the plastic diffusing panels.

In both systems the ceiling units can be removed easily to facilitate lamp maintenance and for cleaning purposes.

The Majestic cubicle type of switchboard which is made by Bill Switchgear, Ltd.

The A.E.I. anti-corrosion fitting is designed for use in humid and corrosive atmospheres.

The new Loblite universal fitting can be fixed to walls either flush or at an angle, or to ceilings. It is dust and moisture proof.

Moisture-proof fittings

A.E.I. Lamp and Lighting Co., Ltd., have recently made for special projects single-lamp five-foot fluorescent fittings especially designed for use in humid atmospheres where condensation either of water or more corrosive liquids may either occur on the fitting or result in liquid falling from above. These will be incorporated in their standard range in due course.

Two versions of the fitting will be available—the standard *Watershed* fitting, which is suitable for use in all non-corrosive atmospheres of high humidity, and the anti-corrosion *Watershed* fitting, which will withstand highly corrosive conditions.

Both fittings consist of a *Perspex* or PVC combined watershed and reflector providing a cut-off and protection for the lamp holders and the compact metal box housing the auxiliary gear.

The power pack used with the standard-type *Watershed* fitting is of heavy gauge sheet steel, bonderised and stove-enamelled white. Switchless starter gear is used. The lampholders are fixed B.C. of white plastic with slip-over end shields.

The anti-corrosion *Watershed* fitting is basically the same as the standard fitting, but the power pack and the lampholders are fully protected against corrosive agents.

The power pack is made of heavy gauge sheet steel completely sealed and coated with a paint containing *Epikote* phenolic resin.

Fixings for both types of fitting are at 42-in. centres, and either hook or $\frac{3}{4}$-in. conduit suspension may be used. Neoprene and galvanised steel washers are used to seal the holes where the suspension assemblies pass through the reflector to the power pack.

Weather-proof lights

Outdoor lights and those exposed in particularly wet places often present problems, and Loblite, Ltd., provide an insulated weather and dust proof industrial wiring system comprising a range of non-corroding lighting fittings and accessory surface wiring with cable or plastic conduit. Lighting fittings are available for ceiling and wall mounting in 65/70 and 100/150 w. sizes. They consist of a strong plastic gallery and screw-necked clear or opal glass covers.

The latest addition to the range is the *Universal* wall glass fitting, which will accommodate lamps up to 150 w. and can be fitted to a wall in either a straight or inclined position, or to a ceiling without modification.

The same firm also make *Prismalite* bulkhead fittings in sizes up to 100 w. These are constructed with plastic housings and prismatic glasses that give excellent light distribution, and are suitable for indoor or outdoor use. The fittings are said to be watertight and dustproof, and to need practically no attention once installed.

Switch and distribution boards

For every scheme of factory lighting, however large or small, the source of electric supply must inevitably have some means of effective and safe control, also an efficient method of distribution which includes protection from damage occasioned by overloading or short circuits.

For this purpose Bill Switchgear, Ltd., manufacture a comprehensive range of equipment from main incoming control switchboard panels to the final sub-circuit distribution fuse boards.

Two types of main switchboard panels are made—one of open type which is suitable for medium voltage distribution, and the other the *Majestic* cubicle type, which is totally enclosed.

From the main switchboards, usually located in the control switch room, the generally accepted practice is to distribute the various circuits to banks of fuses arranged in the form of metal clad distribution fuse boards, conveniently situated at various points in the factory. This system enables the lighting and power schemes to be economically wired and correctly fuse protected. Bill Switchgear, Ltd., also produce an extensive range of metal clad distribution fuse boards. As with the switchboards two distinct types of fuse boards are manufactured. The *Vertex* fuse boards are made in various sizes from 15 amp. to

(*Concluded on page 337*)

FACTORY LIGHTING

and the Food Industry

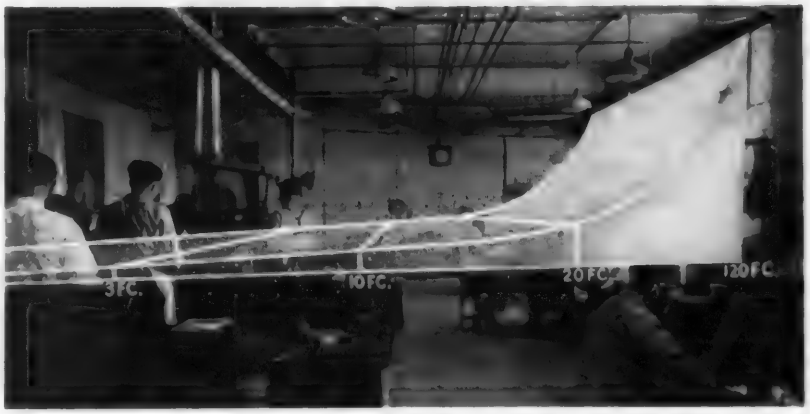
By W. Robinson, B.Sc., A.M.I.E.E., F.I.E.S.*

The general level of factory lighting has improved considerably in recent years, but the installation, maintenance and operation of lighting systems still receive too little consideration by many firms. In this article, a lighting expert discusses modern trends of thought on this important aspect of efficient factory operation.

ANYONE who has had the opportunity of seeing a cross-section of British factories must have been struck by the enormous variation in lighting standards and also by the widely differing outlook of both management and executives to artificial lighting. It will be noticed that, whereas there is a large measure of common accord on such matters as plant layout, power application, day-lighting, ventilation and heating, there seems to be no common ground regarding artificial lighting. In some factories the electric lighting is the responsibility of the plant department, in others it is left to the maintenance engineer, and very often it is left to the works electrician. Some managements appear to be interested only in lighting economies, and often a management with more liberal ideas receives little support from production executives, who would sooner see the money spent on plant.

There are, nevertheless, many well lighted factories today and it is almost invariably the case in such factories that management has provided the impetus, and that the high standard of lighting is apparent in efficiency and in labour relations generally. It is not thereby implied that good lighting necessarily means high efficiency and smooth labour relations but rather that the standard of lighting is closely linked with the standard of management.

The Food Industry is perhaps, more dependent than many on the maintenance of a high standard of lighting, for without it there can be no assurance of absolute cleanliness and no certainty that colour and appearance standards are being maintained. In this article it is proposed to review the factors governing the installation of lighting, the equipment available, its maintenance and operation and an important aspect of lighting economics.



Typical horizontal illumination distribution from side windows (in foot-candles). The variation is masked by the relatively high brightness of the vertical surfaces and can usually be detected only by lightmeter measurement on horizontal working surfaces.

Illumination requirements

The first job of factory lighting is to let workers see what they are doing. This may appear platitudinous but in fact the problem is not a simple one at all for there are relatively few people in industry who even know how much light their workers are receiving, still less how much they ought to receive. Illumination, that is the amount of light falling on a given area, is more easily and quickly measured than is temperature. The unit of illumination, however, is not so well known, being the "foot-candle." This term need not worry anyone if it is used merely as a convenient measure of illumination just as degrees fahrenheit or degrees centigrade are used as the measure of heat. In the same way as we need a relatively modest temperature for bodily comfort and higher temperature for particular processes so we can get along with only a little light until faced with specific tasks when we find that we need more and more light—*i.e.* higher illumination, as the visual demands of the task increase.

The first requirement, therefore, in planning or judging any lighting installation is to find out what is the minimum illumination required for the various parts of the factory. This is quickly and easily discovered by reference to tables which have been evolved by the Illuminating Engineering Society giving minimum recommended values of illumination for a great variety of industrial tasks. Table I summarises the illumina-

* British Electrical Development Association.

tion recommendations covering the major requirements of the Food Industry.

Take a look at your lighting

This is the starting point either for designing a new lighting installation or for improving the present one. The artificial lighting of many factories was installed some considerable time ago, when neither lamps nor equipment offered anything like the present scope and when far less was known about the science of lighting than is now the case. The main purpose of this section, therefore, is to suggest to works engineers, and managements, and, indeed, all who are concerned not merely with lighting but with the efficiency of their factory and the well-being of their workers, a procedure by which they can judge for themselves whether the lighting of their plant is really satisfactory and what they can do to remedy any defects.

A lighting survey

A systematic survey can give invaluable information and it can be carried out by anyone with the aid of an inexpensive pocket lightmeter such as the one shown in the accompanying illustration.

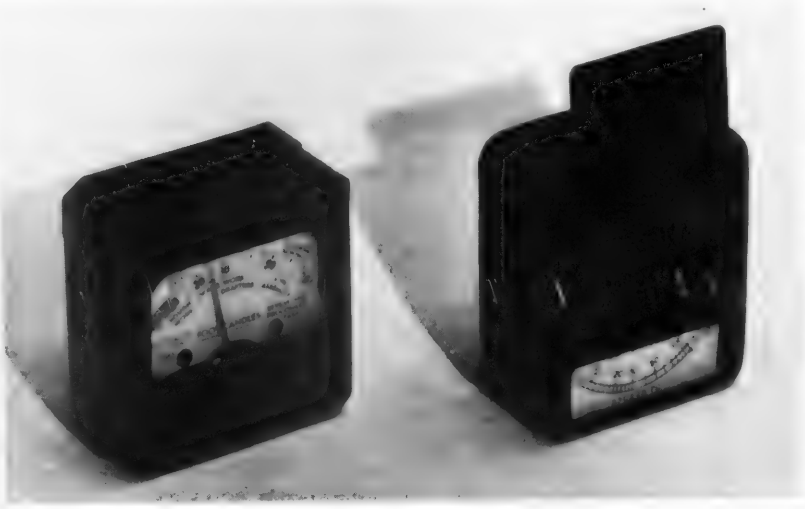
The first step is to measure the average illumination at working height from the artificial lighting alone and compare with recommended values (Table 1). Make a note of the variation in illumination when measured directly beneath fittings and between fittings. If this is more than 30% the fitting's spacing is too wide.

The next, and most important stage, is to place the lightmeter at typical working positions and take readings (*a*) with the operative out of range and (*b*) with the operative at normal working position. It often comes as a surprise to find how little of the light available finds its way to the right place, and it is a simple matter to trace the trouble to wrongly placed lighting fittings giving excessive shadow.

The next stage is to make a series of visual observations as follows:

Table 1. Recommended illumination values for food manufacture

Work	Illumination (Foot-candles)	Remarks
Inspecting and grading	50	
Refining, mixing, blending, cleaning, sweet making, and confectionery	10	
Bottling, canning, packing, flour milling, bakehouses, and cutting benches	10	
Laboratory		
General	20	Colour matching lamps for blending, etc.
Inspection	50	
Machinery		
Very small work	100	
Small work	50	Supplementary Local lighting
Fairly small work	20	
Ordinary work	10	
Packing, labelling and despatch	7	
Offices		
Typing, Book-keeping, and General Office Work	20	
Private Office	15	
Filing	20	
Enquiries, Reception, Waiting Rooms	7	



Typical portable lightmeters.

Glare

Check that all lamps are properly shielded. The Factory Act calls for lamps to be shielded from view at an angle less than 20° below the horizontal and reputable industrial reflectors conform to this requirement. Fittings which have been carefully designed to eliminate glare can be rendered useless if oversize lamps are used.

Look upwards and see if the ceiling is dark, producing a "tunnel" effect and if the lighting fittings are glaring when seen against this dark background. If so, consider directing a little light on to the ceiling. This is not waste, the improvement more than justifies the cost.

Notice whether there is reflected glare from polished surfaces due to lamps being reflected in the surface. Where this is acute either the fittings should be moved or they should be fitted with means of diffusion. Look for shadows under machinery, dark corners where dirt accumulates unnoticed, deceptive and dangerous shadows on gangways, etc.

It is only where one deliberately looks for these things that they become obvious and remedies suggest themselves. Carry the procedure a stage further:

Does the interior look cheerful or depressing? Are the decorations light, or dark, clean or dirty? Is machinery light or dark? light colours reflect light which is used

Vitreous enamelled fluorescent reflectors in paste filling shop.

again. They save money because they give more illumination from the little light wattage used; they reduce glare by providing a brighter background to lighting fittings and they reduce shadow by providing more cross light which gets around obstacles. This particularly applies to machinery, which often is far more in evidence than the walls.

Then what about daylight? Take some illumination measurements during the day both near windows and at increasing distances from them. The illustration shows what can easily happen. The roof might look bright but the downward illumination falls off deceptively from side windows and artificial lighting may well be needed to level up the illumination.

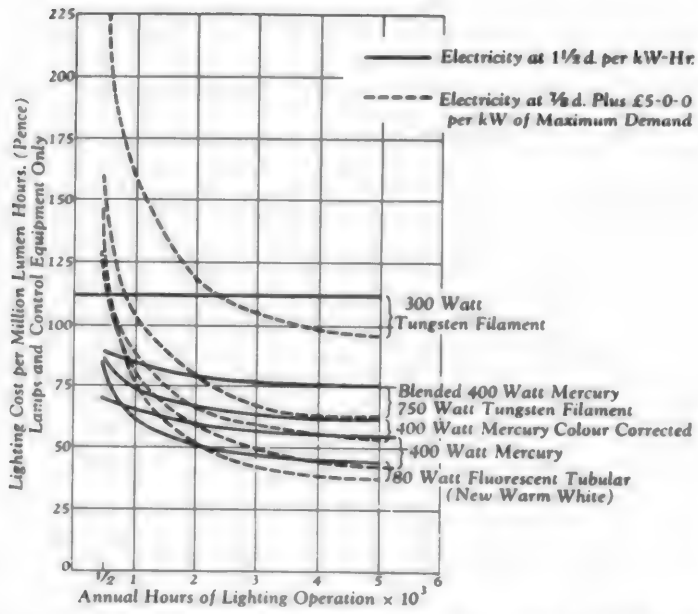
Finally, and most important, take a look at the reflectors. Are the reflecting surfaces white or a dirty grey or brown? Are the lamps clean or dirty? Can the fittings be easily reached for cleaning? There is nothing more tragic than waste of light which occurs in industry generally over the simple fact that neglected lighting fittings can waste 50% or more of light that is paid for, and rob workers of most of the benefit that they should be getting. The food industry may not have the same problems as other industries in respect to dust and dirt in the atmosphere, but condensation and erosion are other enemies that need watching.

Lamps and lighting equipment

For those contemplating new lighting schemes there is now available a wider range of lamps and equipment than ever before. New developments in the colour correction of mercury discharge lamps have made possible their greater use in food factories, and a further incentive is that the colour correction is accompanied by an increase in luminous efficiencies in the higher wattages, 250 w. and upwards. Fluorescent tubular lamps will, however, remain the most important light source for factory lighting, and particularly for food manufacture. Their efficiency is continuously increasing and is now more than twice that of the immediate post-war fluorescent lamps. Another development of great importance can now be mentioned, namely the expected introduction, in the quite near future, of *high-output* fluorescent lamps, *i.e.* lamps which retain the present fluorescent lamp characteristics but which absorb at least a 50% greater wattage for the same diameter and length and give a correspondingly greater light output. These lamps will obviously effect installation savings, will enable higher illumination levels to be obtained, and may prove an inexpensive and convenient method of upgrading existing fluorescent installations. Those who are planning lighting for some time ahead will do well to watch for news of these lamps.

There is now a wider variety of shades of "white" available from fluorescent lamps than formerly, and colour rendering is continuously improving. For those parts of food plants where colour discrimination is very important the *colour-matching* fluorescent lamp can be thoroughly recommended, with only the proviso that enough of it be used. When used sparingly its "skylight" colour tends to give a cold and cheerless effect, but when used in abundance it gives a sparkle, vitality and naturalness equal to north sky daylight. For a warmer effect, often preferred by women workers in particular, the *De-luxe Warm White* lamp is excellent, with a remarkably faithful colour rendering. In most of the production area, however, the *New Warm White* lamp will serve admirably while giving the maximum light output for the energy consumed.

The most interesting developments in lighting equipment are mainly associated with fluorescent lighting. Particularly interesting is the development by several manufacturers of "families" of fluorescent fittings all based on a standard equipment channel to which can be attached a great variety of shapes and types of reflector, diffuser or louvres. By this means production costs are lowered while at the same time different parts of the factory can receive individual lighting treatment, and variations, such as the


Electricity at 1½d. per kW-Hr.
Electricity at ⅓d. Plus £5-0-0 per kW of Maximum Demand
Lighting Cost per Million Lumen Hours. (Pence) Lamps and Control Equipment Only
300 Watt Tungsten Filament
Blended 400 Watt Mercury
750 Watt Tungsten Filament
400 Watt Mercury Colour Corrected
400 Watt Mercury
80 Watt Fluorescent Tubular (New Warm White)
Annual Hours of Lighting Operation × 10³

The curves indicate how annual cost of providing the unit quantity of light (in this case a million lumen-hours) varies according to the conditions of use and the type of lamp.

addition of louvres to reflectors, changes in reflector type, or even renewal of depreciated reflectors can be effected at low cost.

The trunking system of lighting installation, by which the trunking carries the wiring, control gear and light fittings, is now highly developed. Its use reduces the labour of installation, ensures straight lines and orderly lighting fitting arrays, and gives considerable flexibility to the lighting since the reflectors can be mounted anywhere along the trunking and fittings can be added as required.

Another system, cable suspension, is particularly useful for warehouses and large structures with widely spaced supporting points, or wherever the structure is unfavourable to conventional wiring systems.

Lighting operation and maintenance

The installation of lighting is a job for a competent lighting engineer but its operation and maintenance is a matter for the user and it is here that much of the thought, work and expense of installing lighting can be rendered abortive. A lighting scheme must be judged on its ability to provide the required standard of illumination not only immediately after installation but after many years in service and the value of electric lighting depends on whether it maintains good seeing conditions during the entire production period, regardless of whether this is before or after dark.

Operating the lighting installation

It is a remarkable fact that there are many workpeople who suffer from worse seeing conditions during the day than after dark because no one troubled to work out a sensible switching routine. The result, particularly in shops with side windows only, is that the lighting is often switched on only when seeing conditions near the windows become unsatisfactory, by which time those working further away from the windows have been working under a severe visual handicap for perhaps an hour or more, *often without noticing the fact*. There is no doubt that this situation, occurring as it does towards the end of the day's work, causes a distinct slowing down of production and can cause excessive errors and spoilage. It costs very little to switch on the artificial lighting in these sections an hour or so earlier and it is well worth the supervisor's while to consider some scheme which will ensure that everyone in the shop is properly catered for. One way of doing this is to advance lighting-up times to give a good safety margin. There should be no hesitation about switching on *before* the daylight starts to fail. Apart from everything else this helps greatly in smoothing over the changeover from natural to artificial lighting. With good fluorescent lighting, in particular, the end of daylight is hardly noticeable.

The ideal solution, of course, is automatic lighting control by photo-electric cell. This equipment is readily available and should receive particular consideration by those contemplating a new lighting installation.

Table 2. Annual cost of a single storey factory (£)

Functional group	*Fabric*	*Heating*	*Lighting*	*Total*
Ground floor and below	310	310	—	620
Walls and structure	490	290	−30*	750
Roof	720	930	−120*	1,530
Ventilation	30	1,560	—	1,590
Lighting	—	—	950	950
Other	650	—	—	650
Total	2,200	3,090	800	6,090

Table 3. Comparison of annual costs with and without glazing (£)

Component	*Roof*		*Walls*	
	Glazed	*Unglazed*	*Glazed*	*Unglazed*
Fabric	720	520	490	490
Heating	930	410	290	220
Lighting	−120*	—	−30*	—
Total	1,530	930	750	710

* The minus signs indicate the saving in the cost of electric lighting due to glazing.

Fluorescent lighting from walls in a machine room of a biscuit factory. This arrangement is convenient for cleaning purposes and eliminates the danger of broken glass etc. from lighting fittings falling into machines.

Maintaining the lighting installation

The problem of maintaining electric lighting is different from that with other electrical plant since in the latter case maintenance is mainly preventive, *i.e.* a means of keeping the machinery in use and prolonging its life. In the case of lighting equipment, however, it is not the possibility of failure which is important so much as the wastage of light absorbed in dirt deposits on lamps and fittings. This waste of light increases steadily between cleanings, resulting in a fall in illumination which is seldom noticed until the fittings are again cleaned. The only satisfactory solution to the problem of lighting maintenance lies in the adoption of a regular cleaning schedule operated by a maintenance crew who are versed in the routine. Spasmodic cleaning of lighting equipment must result either in over-maintenance or in an unsatisfactory variation in available illumination and reflector surfaces suffering permanent deterioration in the event of an over-long cleaning interval. It is not possible to do full justice to the problem of lighting maintenance in a general review such as this but it cannot be overstressed that unless sound maintenance characteristics are built in to a lighting installation it can never give value for its cost. Equipment which will maintain its efficiency year after year under average factory conditions cannot be cheap, and cheap lighting equipment is almost invariably very expensive in the long run, either because it fails to give the lighting service required or because its maintenance cost is excessive.

The economics of electric lighting and daylight

Good electric lighting will normally cost approximately 1% of the labour cost in a factory. Electric lighting has to be installed regardless of the provision made for the admission of daylight and its capital cost and fixed tariff charges, if any, are not increased by increasing its hours of operation. This feature of electric lighting has a bearing on a matter which is receiving a good deal of attention at the present time, namely, the economic value of glazed factory roofs. In the Building Research Station Digest 109 on Building Economics: Cost Planning, a method is shown of analysing the annual costs associated with factory buildings. Tables 2 and 3 illustrate the method of analysis for a typical single-storey factory.

The following interesting points emerge from the analysis:

The roof glazing (in this case a monitor-type roof) saved £120 a year on electric lighting but added £720 a year to the fabric and heating costs.

The wall glazing saved £30 a year on electric lighting but added £70 a year to the heating.

Half the heating cost was due to air changes, and by far the greatest heat loss through the fabric was via the roof.

The effect of using a solid, flat roof in place of a monitor could, then, be as follows:

A direct saving of £600 a year, 10% of the total annual cost of the building, after allowing for full-time use of electric lighting. A possible further reduction in heating cost in cases where inadequate control of ventilation from roof lights causes an excessive air change rate. A further potential reduction in heating cost by the ability to insulate the whole roof, instead of only part of it.

Electric lighting is a necessity, roof lighting is an expensive luxury. Strange how few people in industry see things that way, but these are the facts. As for wall glazing, it can perform one really useful function, namely, to allow those inside to look out.

A further inducement to extending the hours of daily use of electric lighting is provided by the maximum demand type of electricity tariff which is most commonly applied in industry.

The accompanying graph shows how the cost of electric light varies with different light sources and

(*Concluded on page* 337)

The Problem of Improving Nutritive Value

With Special Reference to the Enrichment of Foods—2

By E. Menden and H. D. Cremer*

In Part 1 of this series of articles, the authors considered the basis of the need to supplement the nutritive value of foods in terms of general nutritional status. In Part 2, they consider the effects of losses due to processing on this need, and discuss the various ways in which improvements in nutritional status may be brought about.

II. The Influence of Processing and Canning on Nutritive Value

THERE are many reasons for the technical processing of food—whether by heat, by refrigeration or by the addition of chemicals: not only does it serve to make food palatable, or to improve the taste; but also these days, when most foods no longer come direct from the grower to the consumer, it permits distant transportation, and prolonged storage, in order to assure the provision of the food requirements of large urban groups. Without adequate processing and canning, intolerable economic losses would result from decay, or from parasites, or from infestation. A report follows on the consequent (indeed inevitable) effects on the essential nutrients of the more important foods which appear from this processing of food:

LOSSES OF NUTRITIVE VALUE IN PROCESSING AND CANNING

1. Flour and Bread

The path from grain to bread leads through flour. The vitamin, mineral and protein contents of bread are dependent upon the method of flour production; and this quite apart from the fact that the contents of the essential nutrients in grain vary with the species, and the cultivation of the soil.[65, 66] Considering the importance of bread in nutrition—40% of all calorie-intake in Germany is covered by grain products[17]—it is not surprising that a large number of survey-reports are available regarding the influence of extraction rates on the vitamin, mineral and protein contents of bread.[34, 65-75] It is clear that the vitamin content, and the mineral content, decrease with a lowering of the extraction rate. For example, the vitamin B_1 content of an "80-per cent." flour is still 50%-80% of the natural content of the whole wheat; in a "70-per cent." flour it is only 12%-40%. Similar values have been found for rye. The corresponding values for vitamin B_2 are: 30%-70%, and 23%-50%, respectively; and for nicotinic acid 15%-50%, and 10%-35%, respectively.[34, 76] Calcium is found in an amount of 27 mg. in 100 g. of wholemeal flour; 20 mg. are still to be found in 100 g. of "80-per cent."; but only 16 mg. in 100 g. of "70-per cent." flour. The corresponding figures for iron are: 3·2 mg.-2·6 mg.-1·9 mg. respectively. The contents of vitamin E and of vitamin B_6 are also reduced.[34] In experiments with rats, feeding with "72-per cent." extraction flour led to significant vitamin B_6-deficiency symptoms, which again disappeared after the administration of vitamin B_6 (pyridoxine).[39]

Simultaneously, a low-extraction rate reduces the quality of the protein—but this, of itself, is not of great importance because of the low level of lysine in grain-protein.[77] With increases in the extraction-rate, the proportion of bran, germ, scutellum, and aleurone components of the flour increases. However, the digestibility and absorption of organic matter are, at the same time, reduced; the assimilation of bread of high-extraction, as of wholemeal bread, varies greatly between individuals.

The later conversion of flour to bread results in further losses in the essential nutrients. Thus reports are available showing losses of vitamin B_1 during the preparation of the dough (by the fermentation process), which amount to about 20%.[70, 78] The action of baking-powder on the *p*H-value also leads to vitamin B_1 losses.[79, 80] Vitamin B_1 losses during the actual baking process occur primarily in the crust, which is strongly affected by the heat;[81] on the average, up to 24% of vitamin B_1 is destroyed.[82] The loss is considerably higher in long baking periods;[83] with whole-rye bread, for example, losses are between 13·5%-55%, depending on the baking period. The highest loss was established with "Pumpernickel" in a 24-hour baking period.[84] Next in importance to the loss of vitamin B_1, the reduction in the nutritive value of the protein is significant: losses run parallel with increases in the baking periods.[44] The "browning reaction" between proteins and reducing sugars could, in part, be responsible for this.[85]

In addition, it has been shown that the chemical treatment of flour, particularly with bleaching agents, partially destroys the vitamins (10%-17% of the vitamin B_1, and 6% of the nicotinic acid), and it should be rejected for this reason.*[86]

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* Recent investigations have shown that chlorine dioxide when used as a flour improver destroys the vitamin E in flour.—T. Moore, I. M. Sharman and R. J. Ward. *J. Sci. Food Agric.*, 1957, **8**, 97.

2. Fats

The technical treatment of fats (whether by refinement or hydrogenation) results in the extensive destruction of the fat-soluble vitamins. In margarine, for example, the whole vitamin content is destroyed after the standard "hardening" process.[8] This fact, especially in the more civilised countries, creates a need for increases in the fat-soluble vitamin A and vitamin D intakes.[16]

3. Milk

It can be concluded from the various reports on the effects of processing on milk that neither the vitamin content nor the nutritive value of the protein can compare with that of unprocessed milk, particularly in the case of highly heated products (sterilised milk, condensed milk, and roller-dried milk solids). Significant losses of vitamin A, vitamin E,[81] and of pyridoxine[87] have been established in sterilised milk; vitamin C was completely destroyed;[18] and the nutritive value of the protein was also reduced.[88, 89, 90] Vitamin A could no longer be found in dried non-fat milk solids.[91]

Supersonic wave treatment to sterilise milk results in a simultaneous loss of vitamins; it destroys up to 46% of the vitamin C and 67% of the vitamin B_2; no change, however, is found in the vitamin B_1 content.[92]

4. Other Foods

Home-prepared foods lose little in nutritive value and availability.[93] Some losses of vitamin C and of some minerals, are to be expected, particularly in vegetables and potatoes.[94, 95, 96] The custom of cooking food, which has been followed for generations, cannot, under any circumstances, be described as "Man's erring way." It offers many advantages and makes possible the utilisation of numerous foods which one would not eat raw.

Considerably greater losses of the vitamins, the minerals and the proteins are to be expected under the influences both of long heating periods, and of cooking under high-pressure, such as are particularly found in communal kitchens.[97] For example, the usual restaurant foods, in general, only sparsely cover the mineral requirements.[98] Of the vitamins, vitamin C and vitamin B_1 are partially destroyed—up to 22% in vegetables.[82] Later experiments have shown that a short cooking period is favourable under pressures up to one atmosphere—the losses of the vitamins under these conditions being no higher than those usual in home-prepared foods.[99] A considerable loss of vitamins may always be expected in canned goods, unless proper precautions have been taken against such losses during the canning process.[100] This is shown in reports on losses of nutritive value which have been observed in the preparation and storage of "Combat-rations" for the U.S. Army.[101, 102] Losses particularly appeared in vitamins A and C, both sensitive to oxygen; up to 50%-60% of heat-sensitive vitamin B_1 was destroyed in some canned goods; and a heavy loss of vitamin B_6 (pyridoxine) must be taken for granted.

OTHER INFLUENCES OF FOOD PROCESSING ON NUTRITIVE VALUE

The processing of food does not, of course, produce only harmful effects; in a number of cases, it has provided advantages in the use and assimilation of certain foods. The utilisation of carotene, in vegetables containing it, is much improved by cooking.[93] The B-complex vitamins contained in live yeast-cells are only fully available to the human organism after the yeast has been killed by heat.[103-106] In some cases, the proper utilisation of protein follows only after pre-heating.[93]

Similarly, the milling process, by its separation of the outer layers of grain, makes possible a more favourable utilisation of calcium. These layers are especially rich in phytin, an inositol-phosphoric acid compound, which, together with calcium and magnesium, forms insoluble chemical combinations which the human organism can no longer utilise; this is, indeed, a general rule: whenever calcium and phytin occur together in the same food the calcium cannot be assimilated. The higher the extraction-rate the more this danger is increased.[34, 69, 107] There is some possibility that phytin may hinder the absorption of iron.[68]

The Possibility of Improving Nutritive Value

I. The Influence of Eating Habits

Man's nourishment no longer depends, as does the so-called lower animal's, on "instinct," but rather on experience and on knowledge. Tradition, and deep-rooted eating habits, regulate the selection of food; but a contributory factor—especially in recent times, arising from the advance of civilisation—is the much larger range of palatable and easily digested foods. As we have already seen, the average diet (of large groups of people) thus obtained, shows latent deficiencies in some essential nutrients, and this has led to an urgent demand by nutritionists and physiologists for an improvement in general nutrition by supplementation with these nutrients. One possible way of implementing this demand is so to influence eating habits that certain foods containing vitamins, minerals, and proteins, which have up to now been neglected, will be given greater consideration in the selection of food. Indeed, this has already been tried in a number of ways: thus an experiment was undertaken in Switzerland in 1937 to increase the consumption of wholemeal bread, because the widespread preference for bread made from low-extraction flour was leading to the danger of deficiencies in certain essential nutrients.[10, 108] The experiment had an economic basis: prices were regulated so that wholemeal bread was 25% cheaper than white bread. At the same time, with government support, an educational programme was begun de-

tailing the advantages of wholemeal bread. In a matter of weeks the sales of wholemeal bread actually reached 75% of the total national bread sales. But the reverse process set in very soon after in spite of the price advantage. In early 1938, the percentage had dropped to 38% of consumption; and, at the end of the same year, it was only 11%. It is significant that, before this experiment, 10% of all the bread sold was wholemeal bread. In the United States, too, experiments were undertaken to introduce wholemeal bread, but these proved to be negative, in spite of large-scale propaganda.[10] In Germany, a greater consumption of wholemeal bread, or bread produced from high extraction flour, has been similarly encouraged in various ways,[22, 84, 109, 110, 111] but without any remarkable results. In the face of these facts, it must be concluded that such experiments depend more upon public taste than upon differences of assimilation in individuals.[6, 7, 17]

An alternative way of influencing eating habits—a way not limited to popularising foods only—lies in the teaching of correct nutrition, to the individual consumer and to family food councils, through the radio and the press.[11, 112, 113, 114] The Food and Agriculture Organisation of the United Nations has concerned itself with this problem, and has published suitable guiding principles.[56] Courses in nutrition should be established in schools; indeed, the establishment of a compulsory "Nutrition Course" in all schools and universities is being requested in Germany.[112] Fundamental changes in eating habits, however, are hardly to be expected. Nevertheless, in the course of time, some improvement in the supply of the essential nutrients in the average diet should follow. Thus, an increase in the consumption of fruit and vegetables is recommended for improvements in the vitamin intake;[115, 116] for improvement in the mineral intake, particularly of calcium, a rise in the consumption of milk, cheese and green vegetables is necessary.[47, 116] More suitable combinations of the various proteins in different foods are desirable in order to improve the protein supply; these will yield proteins of full biological value, because of the varying contents of the essential amino acids.[61, 117] A reduction in the consumption of fat is recommended to allow a better utilisation of protein. Fish, milk, and cheese are foods particularly recommended for their protein content.[118] Taken together, the measures adopted to influence eating habits up to the present time have proved to be of limited and of temporary worth. The improvements which were sought in the essential nutrients of the diet of large groups of the population have not materialised.

II. Better Nutritive Value through Improvements in Processing Methods

Another way in which nutritive value may be supplemented lies in improvements in the processing methods to which many foods are subjected. Damage to, or removal of, essential nutrients could be lessened. Only a limited improvement in the nutritive value of the usual foods consumed by the larger groups of people can be achieved in this way, however. The combination of foods, and the low values of certain of the essential nutrients in many foods, both remain unaffected. Moreover, corrective technology is restricted by a number of processing measures which are necessary and unavoidable—but which must result in losses of nutritive value. These "unavoidable processing measures" include the usual procedures in the home, as well as certain preserving procedures. Of late years, improvements have been made in methods of preservation particularly: thus, losses of vitamin C are insignificant during careful heating after the elimination of oxygen.[93]

The first indications of an assured improvement in the nutritive value of flour and of bread may be in the two spheres of grain breeding and plant fertilisation.[17] The biological value of grain-protein is 4·5% higher after fertilisation with super-phosphate and ammonium sulphate or potassium nitrate.[119] Moreover, better conservation of nutritive value may be obtainable in the milling process (so-called "vitamin-milling"):[17, 120, 121] for example, in rice-milling, a process has been developed which carefully removes the outer layers without removing the germ. Hence the rice retains more of its vitamin B and mineral contents.[122]

Baking also results in some loss of essential nutrients. In consequence, various methods have been tried to obtain improvements in nutritive value—by an improvement in the retention of the vitamins and the proteins—by changes in the baking process, especially of wholemeal breads,[123-126] in general, however, with insignificant results.[127] A certain minimum baking period is necessary to produce an easily digestible, and well-assimilated, bread.[128] A reduction in this baking time, in order to reduce the loss of vitamin B_1, adversely affects the nutritive value of the bread by hindering digestion and assimilation.

*III. The Enrichment of Food**

THE ENRICHMENT OF FOOD AS A METHOD OF IMPROVING NUTRITIVE VALUE

Our inability permanently to influence eating habits, or substantially to improve processing methods in order to obtain better nutrition for the larger groups of

* By "enrichment" is meant the addition of essential nutrients to foods (*a*) which have suffered losses during processing; (*b*) the natural composition of which is not ideal; or (*c*) which have been selected as vehicles for extra quantities of some nutrients already present, but only in insufficient quantity, in the rest of the diet. The terms "fortification" and "restoration" are sometimes used. "Enrichment," in a narrower sense, is used to indicate the addition of nutrients which have been destroyed during processing, or which do not occur naturally in a selected food in optimal amounts.

When "enrichment" consists wholly or principally of an addition of the vitamins the term "vitaminisation" is also used.

people has already been discussed. Compared with this, the systematic addition (or replacement) of food factors missing from staple foods seems a much simpler and more effective method of raising health standards and of improving the diet of those who are economically poor—who constitute the larger part of the population.[1, 33, 35, 129-132] As long ago as 1936, this criterion led a committee for nutrition of "The Council on Foods and Nutrition" of the American Medical Association to examine the question whether certain foods can be improved by supplementing them with vitamins and minerals. It recommended the addition of vitamin D to milk and of iodine to table salt.[10, 133] Thus began the movement towards the enrichment of foods with selected essential food factors; this has since led to extensive enrichment measures, either on a voluntary basis or enforced by law, in many countries of the world.[134, 135]

The fundamental principles of enrichment can be summarised as follows: a comprehensive supplementation of food with vitamins, minerals and proteins is possible only if these nutrients are added to staple foods which are both cheap and often eaten; this generalisation excludes enrichment measures for particular purposes—as, for instance, for military rations. First to be considered in Germany, as in most of the other civilised countries, come bread, margarine and, to a lesser extent, milk and canned vegetables. In many countries overseas, rice takes the place of bread. The proper nutrients should be added to individual foods: to cereals, the B-vitamins, calcium, iron, and a certain amount of high-value protein; to oils and fats, vitamins A and D; to fruit and vegetable products, vitamin C.[136] The choice of foodstuffs intended for enrichment must be based upon any reports of nutritional deficiencies which are available. The extent of the supplementation should be determined first according to the natural content of the food; and also according to the daily requirement of the particular food factor.[136] However, the diet must be considered as a whole; addition limited to the normal content of the natural product is too narrow and unnecessary a restriction for individual foods.[137] The form in which enriching materials are added to foods—whether as pure chemical substances or as natural products consisting of a combination of various elements—is of secondary importance; the deciding factor may be merely convenience of use; but nutrition, economics and psychology all play a part. If the food which is to be enriched is expected to lose nutritional value during prolonged storage, or during processing, then this must be taken into account when the amount of the supplementation is determined; otherwise, supplementation will be useless.[138]

The actual introduction — or even the proposed introduction— of food enrichment has occasionally given rise to violent arguments. For example, in certain circles, the addition of essential nutrients to food is rejected on the emotional grounds that the "natural harmony" of the food would be disturbed.[121] This kind of opposition rests on the anthropocentric idea that the entire world was made to serve man.[139] From the accumulated experience of many years, however, there can be no doubt that enrichment has had only a favourable influence on public health.[140, 141] Equally meaningless is the objection that it is a "waste" to supply the population indirectly with vitamin B_1 in bread, because losses during storage and processing are economically insupportable: an ample supplement of vitamin B_1 in bread, in which the expected manufacturing losses have also been taken into account, means a rise in cost (from 1952 accounts) of 0·4 pfg.,[112, 143] and from later accounts (1957), of only 0·2 pfg., per kg. of flour.[144]

These cost estimates are based on the enrichment formula adopted in the U.S.A. In Great Britain, the enrichment of flour on the basis of the prevailing prices for the enrichment mixtures (1958) costs 0·012d. per lb. of flour.

An undeniable weakness in the current practice of enriching foods lies in the fact that (even according to our present knowledge) not all the substances which may be necessary are being added; hence, enrichment is not the ideal solution—yet. Nevertheless, the addition of *some* substances already known to be necessary guarantees a substantial improvement in the nutritive value of food.[108, 132, 145] The enrichment of foods may be included as a recognised application of the principles of nutrition to questions of public health; it may be regarded as equal in rank to other hygienic measures such as vaccination, insect control, water-purification, and the pasteurisation of milk.[141]

In subsequent articles in this series, the authors consider the actual enrichment of particular foods with specific dietary essentials.

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The Elimination of Pathogens from Frozen Whole Egg–2

By C. L. Heller, N. R. Knowles and K. Bryce-Jones *

In Part 1 of this article, which appeared in our June issue, the authors dealt with the incidence of pathogenic organisms in frozen whole egg, and with the effects of pasteurisation. In this second part they discuss the production of pasteurised frozen egg.

The production of pasteurised egg

In the production of pasteurised frozen egg blended pulp is made as described above and a pasteurising unit is incorporated at the chilling stage. In addition, it is necessary to provide adequate supplies of hot water for heating the raw pulp and chilled water for cooling the pasteurised pulp.

Raw pulp, filtered and chilled, is led to an insulated storage tank and from there passes through an homogeniser to the pasteurising unit, which can be of the plate heat-exchanger type commonly used for the pasteurisation of milk. In the pasteuriser the pulp is preheated, subjected for the required time to the pasteurisation temperature and then cooled before passing to a holding tank which feeds the filling unit. For the destruction of the salmonellæ likely to occur in egg pulp, temperatures of 144·5°F. to 146°F. for a minimum of 2·5 min. are adequate provided there is strict control of the process. It is essential that the pasteuriser be fitted with a flow diversion valve which will automatically return any pulp which is not subjected to the full pasteurisation treatment. It is also necessary for the unit to incorporate a control which varies the temperature of the hot water automatically to compensate for the loss in heating efficiency which would occur if a film of egg solids forms on the heating plates, and also operates a warning device.

Whole egg pasteurising plant, made by A.P.V. Ltd.

Physical effects of pasteurisation of liquid whole egg

Hanson, Lowe and Stewart[50] found that pasteurisation below 160°F. had no harmful effects on liquid whole egg when used for making custards, but the texture and shape of sponge cakes was adversely affected. Stewart[38] found that laboratory baking tests on egg pasteurised at 142°F. for 3 min. showed a small but consistent loss of quality in the making of sponge cakes, but this loss was not evident in commercial baking tests. Miller and Winter,[39, 42, 43, 52] in a series of publications, reported that temperatures of 140°F.-146°F. for up to 4 min. had little, if any, deleterious effect on commercial quality when pasteurised egg was used for making mayonnaise, baked custards or scrambled eggs. The volume of sponge cakes was lessened, but not appreciably. Goresline *et al.*[44] reported that flash heating at 140°F. for 3 min. did not seriously affect the functional qualities of the products they studied. Knowles[49] found that time-temperature combinations slightly in excess of 2 min. at 146°F. did not appear to lead to any significant functional deterioration except for a slight loss in raising quality.

In recent years the bakery trade has used considerable quantities of U.K. and imported pasteurised frozen egg which have given commercially acceptable products. A partial separation sometimes occurs

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on thawing pasteurised frozen egg, but if the egg is homogenised before use it can then be processed in the same way as raw egg.

Farrand[51] has discussed the use of pasteurised frozen egg on a commercial scale, and has suggested that there would appear to be no obstacle to its use in trade circles. After using some 500 tons of pasteurised egg prepared in N. Ireland to a definite specification, Farrand came to the conclusion that homogenisation prior to heat treatment may cause low initial viscosity, but suggested that considerable improvement could be brought about by allowing sufficient time for maturation to occur during cold storage.

The pasteurisation process, in addition to being lethal for salmonellæ, kills most of the spoilage bacteria. Consequently the pasteurised product has a much improved keeping quality—it does not sour on defrosting and unused quantities can be left in a refrigerator overnight without spoilage occurring. Knowles,[48, 49] Miller and Winter[43, 52] have reported an improved keeping quality as one of the results of pasteurisation.

In some sections of the baking trade there is a prejudice against the use of pasteurised whole egg. This prejudice has been maintained over the past ten years partly because of early experience with imported pasteurised whole egg which had been batch pasteurised and into which sodium citrate had been added as an anticoagulant. The sodium citrate gave the egg a brownish colour, and as the defrosted egg lacked the viscous texture normally associated with the unpasteurised product it was assumed to be lacking in "body." These objections were almost immediately followed by complaints of mustiness in pasteurised egg, which were well founded, since the product in question had been contaminated with musty eggs before pasteurisation, and the heating process had not removed the mustiness although it had killed the responsible bacteria. Pasteurisation does not reduce the need to use first quality eggs to obtain a first quality product.

Tests of pasteurisation

It is desirable that simple tests should be available to check the efficiency of pasteurisation. The most obvious test would be a direct one for the absence of salmonellæ, but such a test would be slow, require quite large samples, and would be expensive. Similar circumstances with regard to the testing of pasteurised milk has led, in many countries, to the adoption of methods which test for the presence of enzymes which occur naturally in raw milk (phosphatase and peroxidase) and which are inactivated by pasteurisation treatments. Egg is pasteurised at temperatures lower than those used for milk, and this reduces the possibility of using a test similar to the phosphatase or peroxidase tests. Other tests (resazurin and methylene blue) for pasteurised milk depend on the colour changes which occur when a sample of milk is incubated with one of these dyes. The colour changes give an indication of the bacterial contamination in the sample. Scott and Gillespie[53] have described a resazurin test which is used for raw frozen egg in Australia, and possibly this method could be adapted for pasteurised egg.

The microflora of raw liquid egg consists largely of Gram negative rod-shaped spoilage bacteria which have heat sensitivities similar to those of salmonellæ, and consequently one effect of pasteurisation (in addition to the killing of salmonellæ) is a large reduction in the number of viable bacteria with a corresponding elimination of one type of bacteria—the Gram negative rods. Knowles,[48, 49] reporting commercial trials, has shown that pasteurisation kills more than 99% of the total living bacterial flora in liquid egg, and that the surviving microflora consists mainly of Gram positive cocci which are not active in producing spoilage. Our laboratory tests have shown that a temperature of 143·6°F. for 4 min. is sufficient to kill 80 salmonella strains[2] and 61 strains of Gram negative spoilage bacteria (principally pseudomonas and proteus strains).

If a sample of commercially pasteurised egg is re-pasteurised in the laboratory the numbers and types of bacteria then found should be much the same as before laboratory pasteurisation. If this is not so, either inadequate pasteurisation or contamination after pasteurisation can be suspected, provided there has been no alteration in heat sensitivity. A test for pasteurisation along these lines would require comparatively small samples and would be less expensive to operate than a direct test for salmonellæ. It would also be more reliable than a direct test, since salmonellæ usually occur in such small numbers in the frozen product that however large the sample may be there is always a doubt attached to a negative finding.

Pasteurisation of egg already frozen

Stocks of frozen egg in which the presence of pathogenic salmonellæ is suspected may be a financial liability. We have therefore investigated the practicability of thawing, pasteurising and refreezing such egg, and in spite of initial doubts as to the practicability of such an operation, Knowles[49] has found it to be feasible on a commercial scale. It was also shown in this way that egg artificially inoculated with salmonellæ could be made safe by a pasteurisation process without untoward loss of baking quality.

Some 35 tons of Chinese frozen whole egg, including a number of infected cans, were shipped to Northern Ireland in a frozen condition and there defrosted by holding for 36-48 hr. in running cold water.

A preliminary trial was carried out in which the pasteurisation arrangements used were similar to those normally adopted for processing home produced liquid egg, namely, a temperature of 147°F. and a holding time of not less than 2 min. Approximately 600 gal. of defrosted liquid were thoroughly homogenised at 3,000 lb. p.s.i. and passed through the plant at a throughput rate of 200 gal./hr. During this trial it was noted that the defrosted and homogenised egg

was much more viscous and thicker than home produced liquid, and it was realised that heat penetration and heat transfer was likely to be less efficient. The rate of flow through the plant was also reduced because of the denser nature of the liquid. Samples of heat-treated egg taken at 15-min. intervals during the 3-hr. run contained *Salm. thompson* in 50% of the samples taken, thereby confirming the decreased heating efficiency of the plant when dealing with the thicker product.

In view of the unsatisfactory nature of the results obtained from this preliminary trial, arrangements were made to increase the number of heating plates in the heat-exchange section of the pasteuriser and also to increase the time of holding in the holding section by the addition of 6 extra holding tubes, bringing the total up to 24 tubes. These modifications ensured that the plant could be operated with a holding period of 5 min. instead of 2 min., together with a greater certainty that more uniform heat penetration would occur during operation.

A further trial was carried out incorporating these modified processing arrangements. In this trial, defrosted Chinese whole egg artificially inoculated with *Salm. thompson* at the rate of approximately 1,000 viable organisms per ml. of egg was used. The culture of *Salm. thompson* used for inoculating purposes was one originally isolated from the heat-treated egg in the previous trial. Approximately 500 gal. of infected egg were passed through the plant at a temperature of 147°F., a holding time equivalent to 5 min. and a throughput rate of 150-180 gal./hr. Samples of heat-treated egg taken at 15-min. intervals throughout the 2½-hr. run were found to be free from *Salm. thompson* or any other species of salmonella.

More trials were carried out, using some 9 tons of naturally infected Chinese egg and the same processing arrangements. A run of approximately 6 hr. was made, during which samples of heat-treated egg taken every 30 min. were free from salmonella infection, although viable *Salm. thompson* organisms were recovered from 4% of the raw samples taken. A further run of 3½ hr. was made, and again heat-treated samples were free from salmonella organisms, although *Salm. thompson* was recovered in 10% of the raw samples taken.

These results confirm that pasteurisation can be used to destroy organisms of the salmonella group in infected frozen whole egg. It is important, however, that consideration should be given to the increased viscosity and thickness of the egg liquid resulting from maturation changes during cold storage, before deciding upon the requisite time/temperature processing arrangements. In the case of unfrozen home produced liquid egg, the holding time during heat-treatment can be reduced and the throughput rate increased, in view of the greater fluidity of the product and the more efficient heat exchanges taking place. Baking tests on the pasteurised Chinese egg showed that it had a normal aeration time and was of an acceptable baking quality as judged by a sponge test. It gave a fairly satisfactory baked custard but a poor madeira cake.

Summary

It is impossible to be certain that eggs used in the production of frozen whole egg are free from pathogenic salmonellæ, although the proportion of eggs so affected appears to be very small. Nevertheless, one infected egg will contaminate a batch derived from many thousands of eggs, and may render the batch suspect.

Pasteurisation of pulp before freezing greatly reduces this risk and, with adequate control, can be done without significant detriment to the technical quality of the product. Good results have been achieved when the pulp is held at a temperature between 144·5°F. and 146°F. for a period of 2½ min.

Pasteurisation does not reduce either the desirability of using first quality eggs, or the need for a most careful hygienic practice during processing.

It is possible, with adequate precaution, to pasteurise egg which has previously been frozen, although such a process must be considered abnormal.

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Lighting Equipment

(*Concluded from page* 324)

300 amp. fuse rating, each in single, double and triple pole with neutral busbars. Apart from this standard range, the *Vertex* distribution boards are also available in a variety of special designs and can be made to suit engineers' and consultants' individual requirements.

A standard range of combined switch-fuse boards is listed for group lighting control, where for convenience and easy maintenance individual switching and fusing are required as complete units.

Factory Lighting

(*Concluded from page* 329)

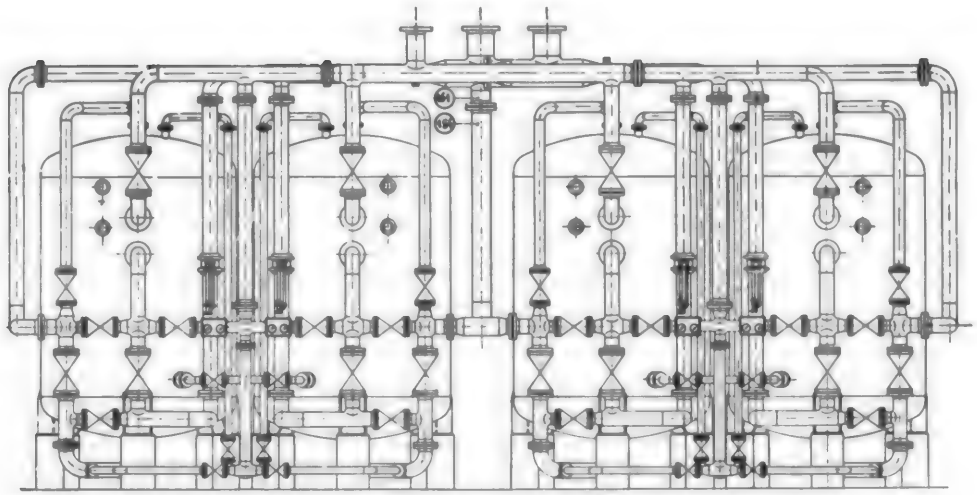
with either a flat rate tariff or a tariff based on maximum load demand. It will be seen that the cost of a unit quantity of light decreases with either method of charge but on a maximum demand basis the lighting is obtained at a relatively high cost when it is used less than 2,000 hours a year and at a successively lower cost the more it is used.

All the considerations outlined in this section support very strongly the view that anyone contemplating a new lighting installation should base his planning on the premise that electric lighting will be the major source of light and that it is likely to be in virtually full time operation when the factory is working.

NEW TYPE DUTCH FILTER

Trials in European Sugar Factories

By John Grindrod



Flow-sheet of an installation consisting of 4 Immedium filters.

DURING the 1955-56 sugar campaign, interesting experiments were carried out with a new type Dutch filter in various sugar factories in Holland, France and Germany, which have shown how juices whose filtration has hitherto proved next to impossible by ordinary sand filters can be successfully filtered.

Developed for the filtration of liquids other than water by Industrielle Maatschappij Activit N.V. (IMACTI), of Amsterdam, this *Immedium Filter*, for which patents have been granted in a number of countries, can also be used for the filtration of raw glucose juices prepared from maize and potato starch, oils, solvents, pectins, alginates and similar fluids. For the filtration of water it has been specially developed by Duper Waterreiniging N.V., of Amsterdam. Both companies are subsidiaries of Koninklijke Zwavelzuurfabrieken v.h. Ketjen N.V., also of Amsterdam.

When filtering takes place by traditional sand filter the liquid to be purified is introduced at the top, filtration being effected in a downward direction. During backwashing the grains come adrift and subsequently arrange themselves according to size in such a way that the finest particles lie at the top of the filter-bed and the coarser grains at the bottom. The impure liquid therefore passes first through the finest particles, thus increasing the risk of rapid clogging of the filter-bed, so that the coarse filter material takes less part in the filtration process. The liquid cannot normally be introduced in upflow through the coarser material first because it would create a similar situation to backwashing and the finer top particles of the filter would come adrift.

Because of its special construction, however, the Immedium filter makes upflow filtration possible. By this method, the liquid to be filtered is divided and enters the filter both at the top and bottom, the purified liquid being drawn off by means of a drainage element in the fine material at the top of the filter layer. That part of the liquid which flows from top to bottom passes through a thin layer of sand only, and the pressure of this liquid on the sand layer prevents any displacement in the filter-bed caused by the upward pressure of the liquid which enters the filter from the bottom. Passing through the largest column of material, the latter represents the bulk of the liquid filtered since the downward stream rapidly decreases as a result of the clogging of the top layer.

The period capacity of this new type filter (*i.e.*, the quantity of liquid that can be filtered between two cleanings of the filter) is many times greater than that of a conventional sand filter. The linear filtration rate varies with the type of liquid to be filtered. The new filter is considered preferable to a filter-press, since the whole process, including backwashing, takes place in an enclosed system. Moreover, "sweetening on" and "sweetening off" pass off easily. The composition of the filter material depends on the liquid to be filtered and is carefully selected for each case separately.

Several types of sugar juices were experimentally treated in the continental factories during the 1955-56 beet sugar campaign. These included raw sugar juice, Werquin's pre-limed juice, first-carbonatation juice after its filtra-

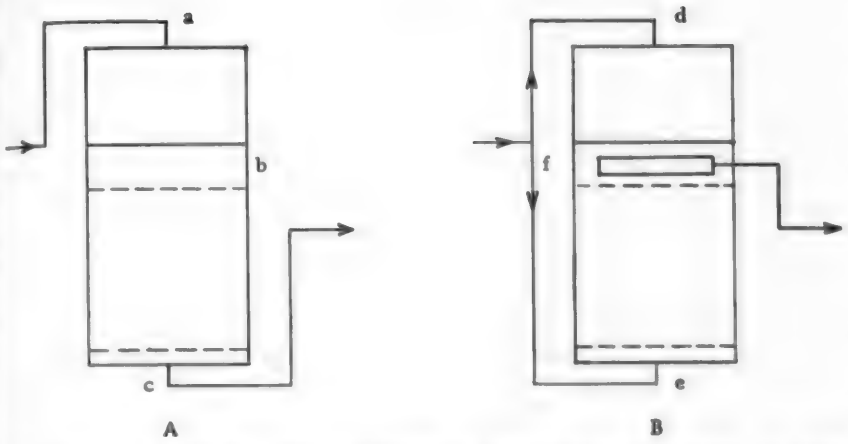


Diagram A shows the course of filtration by the old type of sand-filter. The liquid enters the filter at *a*, passing first through the finest grains of the filter-bed at *b* and is evacuated at *c*.

Diagram B shows the principle of the filtration by means of the Immedium filter. The liquid to be filtered is divided and enters the filter both at *d* and *e*. So the liquid flows two ways, viz. from *d* to *f* (principle of the ordinary sand-filter) and from *e* to *f*; *f* is a draining body through which the liquid is evacuated from the Immedium filter; this drain is placed in the top-layer of the filter-bed. The filtration in the downward direction, from *d* to *f*, will soon come to an end on account of the fact that the top-layer of the filter-bed gets clogged. However, the pressure on the upper part of the bed does not cease but is maintained, thus preventing the grains of sand from getting adrift and filtration continues from *e* to *f*.

tion through the filter presses, and thick juices and syrups.

In the case of the filtration of 14° Brix raw juice from the diffusion battery at a temperature of 75°C., the results shown in Table 1 were recorded.

During the filtration, the *p*H of the juice remained unchanged at 6·6, while filtration carried out at a doubled rate of flow gave the same capacity. The filtered juice was much less coloured than when in its raw state and appeared to be transparent in a column of 5 cm. thickness, the unfiltered raw juice being completely opaque.

A considerable advantage of this upflow filtration of raw juice was that removal of small pulp fibres, suspended in the liquid, was obtained simultaneously. This pulp removal has always been rather difficult, even with the aid of special pulp filters.

In the laboratory some tests were carried out using limed and carbonatation juice. Although the end of the beet sugar campaign prevented the company from carrying out a sufficient number of experiments to draw all the desired conclusions, they are certain that advantages may be expected from the Immedium system. It is known, for instance, that suspended pulp is decomposed by lime. Probably the dose of lime may be reduced when using the new Dutch filter, and the absence of suspended pulp will reduce the calcium salts in the juice. The filtration of raw juice, neutralised with milk of lime at *p*H = 7·0 and subsequently boiled, gave the same filtration results as far as both capacity and limpidity were concerned.

Table I. Filtration of 14° Brix raw juice at 75°c.

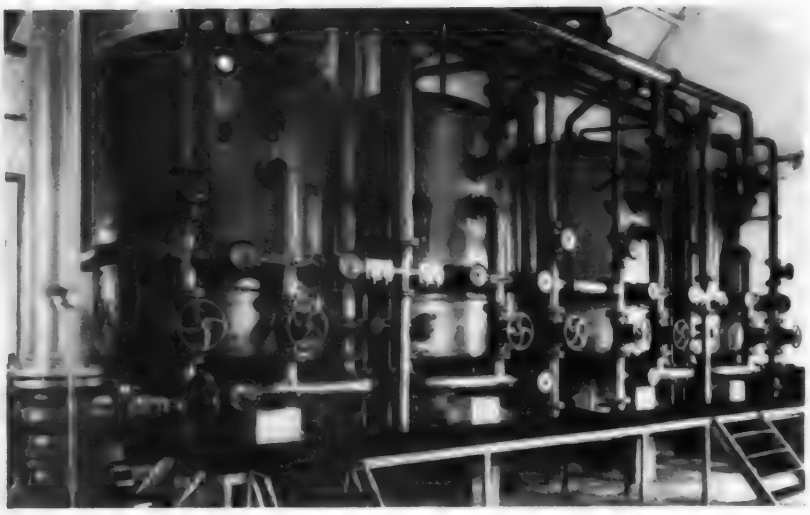
Duration of filtration	*Pressure*	*Filtered volume in m³ per m² of sand contained in the filter*
15 min.	0·6 kg cm²	1·56
30 ,,	0·8 ,,	3·11
45 ,,	—	4·67
60 ,,	2·0 ,,	6·22
75 ,,	—	7·77
90 ,,	3·8 ,,	9·32
105 ,,	4·0 ,,	10·87
120 ,,	4·8 ,,	12·44
135 ,,	5·1 ,,	13·88
150 ,,	5·6 ,,	15·22
165 ,,	6·0 ,,	16·46

The volume of water introduced into the juice by "sweetening on" and "sweetening off" has also been determined. It has been found that when "sweetening off" the filter at a rather high rate of flow, the quantity of water amounts to 0·5 volume, calculated on the volume of the sand bed. If the liquid to be treated contains few impurities, so that the filter has a large total capacity, this volume is of little importance, but if the liquid contains many impurities (*e.g.*, pre-limed juice) this volume of "sweetening off" water plays an important part, since the total capacity of the filter will then be reduced. In this case, say the company, the "sweetening off" operation should be performed at a reduced flow-rate and the volume of water obtained by this operation will be considerably reduced. Figures of even 0·15-0·2 times the volume of sand have been found.

Determination of colloidal matter has been made on the filtered raw juice along the lines of the Dumanskil alcohol method, and a removal of 30% to 40% of colloidal matter was found.

In the Werquin method of preliming juice a small quantity of CaO is added to the juice. The quantity is generally a little more than the dose for ordinary preliming and varies with the purity of the juice, being determined by measuring the difference between the alkalinity before and after filtration of the juices while adding increasing doses of lime. The Werquin point represents the first maximum difference between the alkalinities.

The ideal application of the Werquin process would be to filter the juice after it had been mixed with the correct dose of lime determined in this way. Since such filtration after heating is not technically possible, more CaO is added, together with CO_2, the *p*H value being kept at a constant figure (synchronous - carbonatation). The $CaCO_3$ thus formed acts as a filter aid. After one filtration the effluent is given another small dose of lime and undergoes a second carbonatation. Were it possible to filter the juice as dosed at the Werquin point, the second carbonatation would be unnecessary, the filtered juice being given a slight quantity of lime and then



A bank of 4 Immedium filters installed in a Dutch factory for the filtration of water.

carbonated. This would result in a saving of process time and in considerable quantities of lime.

Attempts were made, therefore, to filter juice limed at the Werquin point through the Immedium filter. Per volume of sand, seven to eight volumes of juice could be treated and the effluent was perfectly limpid. The capacity per hour amounted to two to three times the volume of sand, while the quantity of water added for "sweetening off" amounted to 0·2 times the volume of sand. It was thus established that Werquin juice could be successfully treated.

It often happens that first carbonatation juice, after passage through the filter-presses, does not show the desired limpidity, and an attempt is often made to obtain a limpid juice by a second filtration through bag filters. It was found in the IMACTI experiments that slightly turbid juices could be very successfully treated with the Immedium filter, the results being: capacities of up to 400 volumes of juice per volume of sand per cycle; rate of flow, 20 to 25 volumes/hour; quantity of water for "sweetening off" and "sweetening on," 0·5 to 0·6 volume per volume of sand.

Promising results were also obtained in dealing with syrups, the experiments being all the more interesting because the thick juice to be filtered was obtained from frozen beet in a state of fermentation. The Brix varied between 50° and 65°, and the temperature between 60°C. and 80°C. Per volume of sand 160 volumes of syrup per cycle could be filtered at a flow rate of 6 volumes/hour. The filtered thick juice was quite limpid.

Further tests on pre-limed juice and first carbonatation juice are to be carried out.

Not only is the Immedium filter considered valuable for the filtration of the actual juices, but for the filtration of water used in the sugar factory processes, since the quality of the juice will be at its highest if the water to be used or re-used has been properly filtered.

▶Two booklets have been issued recently by Cooper, McDougall and Robertson, Ltd. One of them describes the uses of the non-poisonous insecticide Pybuthrin while the other gives details of the remainder of the firm's products in this line. Hints are also given on the application of their insecticides.

▶J. Lyons and Co., Ltd., have published a booklet entitled *Ice Cream from the beginning*. It explains simply but comprehensively how ice cream is made and the history of the product. It is intended as an educational booklet for school children, for distribution at exhibitions and to be given away to visitors at the factories.

Improving Nutritive Value

(*Concluded from page* 334)

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▶A recent addition of *Goodyear Industrial Rubber News* contains an article on helping to feed the nation. The article refers to the use of the firm's products in a freezing and canning plant.

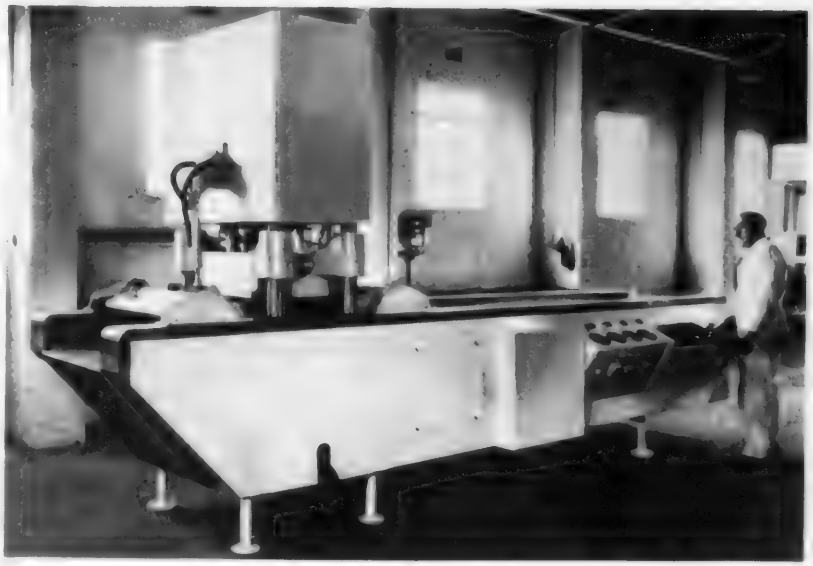
▶The Norway Sild Bureau has published an attractive 12-page booklet in colour giving recipes for appetisers, cocktails, sandwiches, salads and hot dishes to be made with Norway sild. The booklet also gives details on the fishing and processing of sild and the methods used to ensure its distinctive flavour.

New Press for Food Materials

AN effective demonstration was given recently of a new automatic press which will quite clearly find many applications in the food industry. Developed originally for the extraction of proteins from green leaves, the press was used as part of an experimental project at the Rothamstead Experimental Station, where it was quickly and affectionately named the "Mechanical Cow." A report of some of the work carried out at Rothamstead with the prototype press appeared in a previous issue ("Leaf Protein as Human Food," by N. W. Pirie, FOOD MANUFACTURE, 1957, **32**, 416 (September)).

The manufacturers of the press, Modern Mechanisation, Ltd., soon realised, however, that the press had many more immediate applications in industry, and the prototype machine was therefore developed to the stage at which production on a commercial scale could be contemplated. As a result, it is now being placed on the market in a more versatile form.

The press is described as being "intermittently continuous" in operation, material being fed into it by means of a conveyor belt which also acts as a filter cloth. Succeeding quantities of material are isolated by means of gates and then subjected to accurately controlled pressure for a pre-determined length of time. In this way, although the actual pressing action is discontinuous, the machine as a whole functions as a continuous unit, and once it is set in operation it will continue to work automatically until stopped.



The new press for food and other materials which was demonstrated recently.

Design

The machine consists of a hydraulically operated down stroke platen-type press, the bed of which is trough shaped. A conveyor belt passes through this trough, which is 8 in. deep and which fits the platen closely. The belt, made from a filter-type cloth of any suitable textile material (belts of woven plastic have proved very suitable), is arranged to move intermittently under the press platen by means of a hydraulic ram.

The open ends of the trough are closed by means of two hydraulically operated gates. When the gates are closed, the bed of the press forms an open-topped box in which the platen fits like a moveable square plug and on its down stroke will compress the contents.

The conveyor belt in the bottom of the box is supported by a wedge-wire grid which in turn rests on a heavy cast grid designed to take the full load of the press. When the platen descends into the box, liquid is forced out of the material through the belt and wedge-wire grid into a collecting tray, and then via a short pipe to a suitable receptacle or process pipe lines.

The press is preceded by a troughed feed section in which the conveyor belt runs, and material to be processed is levelled prior to entering the press.

The platen pressure is approximately 300 lb. p.s.i., but this can be increased to 450 lb. p.s.i. Any pressure up to this maximum can be automatically maintained for periods of time up to five minutes by means of an electric timer. A range of machines for materials requiring much higher pressures has also been developed.

Advantages

The press is claimed to be the first of its type in the world, and to have several advantages over existing types of roller, screw expellor, batch-type and multi-plate presses. Pressing time can be much longer than with a roller press, and considerably wetter material can be handled than can be effectively pressed in a screw-type machine. Another advantage when foodstuffs are being handled is that no frictional heat is generated during the pressing of the material. Again, the press is self-feeding and emptying, and thus eliminates the need for much of the labour force necessary for the operation of batch and multi-plate presses.

As well as expressing water from foodstuffs and intermediary products, the press has been used for the extraction of oil from a number of seeds, including cotton seed, rape, ground nuts, coconuts, palm fruits and olives. Other visualised uses for the machine are in the juicing of various fruits, including citrus fruit, pineapples, grapes, and blackcurrants.

Advances in Food Technology

DAIRY PRODUCTS

Ultra H.T.S.T. Sterilisation

The introduction of ultra-high-temperature short-time sterilisation represents an important innovation in the dairy industry. But the method can only be said to have been perfected when it has become possible to fill the sterilised milk or cream under sterile conditions into sterile containers in a continuous process. It would be desirable to carry out exact research on the effect of the different types of sterilisation plant on the quality of the sterilised milk or cream in order to find out whether any special advantages can be obtained from any particular type of apparatus. In principle, all sterilisation plants are suitable for the treatment of thickened milk products, but there are certain misgivings against such treatment of certain non-thickened, sterilised milk products.—W. Mohr, *Fette, Seifen, Anstrichmittel*, 1958, **60**, 293.

WHEAT FLOUR

Effect of Oxidised Polysaccharides

Oxidised polysaccharides obtained by periodate oxidation showed marked improving action on dough and on the baking characteristics of wheat flour. The materials used in these studies were oxidised wheat starch and oxidised locust bean gum, the former being 100% oxidised while the latter was from 10% to 100% oxidised.

The addition of these materials increased the resistance to extension and decreased the extensibility of the non-yeasted dough as measured on the Brabender Extensograph. The wheat starch product had an optimal effect when added at a concentration level of 0·03-0·1%.

It was assumed from these studies that the improving effect was caused by a reaction of the aldehyde groups of the oxidised polysaccharides with flour protein.—H. Neukom and H. Deuel, *Cereal Chem.*, 1958, **35** (3), 220.

MEAT PRODUCTS

Effect of Phosphates on Micro-organisms

German food regulations still prohibit the use of phosphate admixtures to meat products such as boiling sausages, although in the opinion of many scientists such admixtures, so far from being harmful, improve the quality of the product. The German Meat Research Institute at Kulmbach has carried out investigations in order to determine the influence of certain commercial phosphate preparations on micro-organisms. At high temperatures, these phosphates were found to have the effect of inhibiting or destroying certain micro-organisms. Others were destroyed even at normal temperatures. It was also found possible to suppress, by means of a phosphate admixture, the germination of certain anærobic micro-organisms.—F. Kelch and X. Buehlmann, *Die Fleischwirtschaft*, 1958, **10**, 325.

ANTIOXIDANTS

Effect on Biscuit Stability

Baked products may be protected from oxidative rancidity by making use of antioxidants in one of three ways; by direct incorporation into the product; by using antioxidant - impregnated papers; and by spraying the antioxidant direct on to the product.

Some difficulty was found in assessing the result of experiments designed to test the effect of antioxidants in biscuits, since the oxidative stability of the products was considerably influenced by factors such as raising agent residues, flour extraction rate, moisture content and trace metal content. In general, it was found that dodecyl gallate used alone and B.H.C. used with synergists had approximately similar antioxidant properties when used at the maximum levels recommended by the Preservatives Sub-Committee.—F. J. H. Ottaway and J. B. M. Coppock, *J. Sci. Food Agric.*, 1958, **9** (5), 294.

VEGETABLES

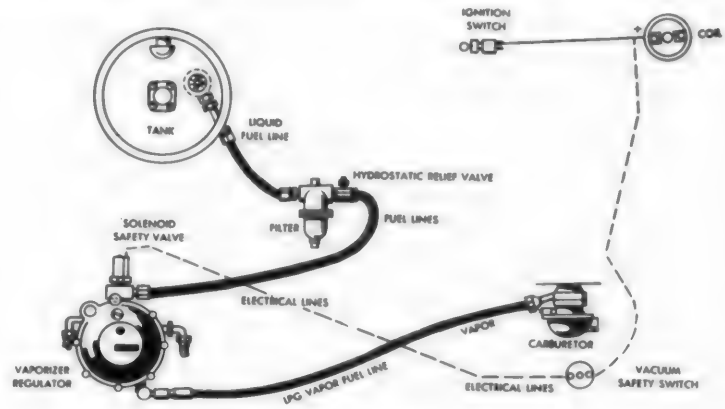
Storage of Frozen Peas

Raw and blanched peas of the variety Thomas Laxton, which had been stored at −17·8°C. for 5½ yr. were used to study the effects of cold storage on the lipids of the peas. Fresh peas of unknown variety were used in the blanched and the raw state for purposes of comparison. The peas were dried by lyophilisation and the liquid material was extracted with anhydrous, peroxide-free diethyl ether.

The unblanched stored peas yielded crude lipids containing appreciable amounts of unsaturated carbonyl compounds. Unsaturated carbonyl compounds were not found in the peas which had been blanched before storage, and these had a higher content of saturated carbonyl compounds than the stored unblanched peas.

Unsaturated carbonyl compounds were also absent from the lipids of fresh peas, whether blanched or raw. These had a higher content of saturated carbonyl compounds than the stored peas, the blanched peas having a considerably higher content of these compounds than those which were extracted raw.—F. A. Lee, *Food Research*, 1958, **23** (1), 85.

Machinery and Equipment



TYPICAL LP-GAS INSTALLATION
(For air-cooled engine)

A range of Hyster trucks fitted with a liquefied petroleum gas fuel system is now available from the Hyster Co. The fuel system is illustrated diagrammatically above.

GAS POWERED LIFT TRUCKS

While the petrol- or diesel-powered fork-lift truck is stated to have an invariably superior performance to its battery-operated counterpart, the fumes emitted by either of the former have made them unsuitable for use in food factories.

It is claimed that the problem has now been solved by making use of *Bottogas*, butane in liquid form, as a fuel for trucks. A range of trucks making use of this fuel has been introduced by the Hyster Co. The gas is said to give very nearly complete combustion, the percentage of carbon monoxide in the exhaust being practically negligible and only light carbon deposits being formed in the engine.

The principle of operation is as follows.

Instead of a petrol- or diesel-fuel tank, a cylinder containing 40 lb. of *Bottogas* butane is mounted at the rear of the truck. This is equipped with a fuel gauge, and can be disconnected and replaced by a full cylinder when it is empty.

The cylinder is so designed as to ensure a free supply of fuel in the form of liquefied gas. A screw shut-off valve allows the liquid to flow under its own pressure through the liquid fuel lines, from which it passes through a filter to the vaporiser regulator. There the liquid is converted into a dry vapour which passes through the vapour line to reach the carburettor, where it is mixed with air in the correct proportions and fed to the engine.

Other features of the system include a solenoid safety valve, which allows fuel to pass only when the ignition is switched on and when there is also a vacuum in the inlet manifold, and a hydrostatic pressure relief valve, which guards against build up of pressure when fuel is trapped between the cylinder valve and the solenoid safety valve.

PUMPING CHOCOLATE

Transferring liquid milk chocolate from conche to storage at the Birmingham factory of C. Kunzle, Ltd., formerly a messy job employing two men for 90 min. with frequent spillages, has become a fully automatic, clean process taking 40 min. by the use of a *Megator M50* pump made by Megator Pumps and Compressors, Ltd.

Now it is only necessary for the valve to the pump to be operated, and the pump switched on; the job may be left completely unattended if necessary, since the sliding shoe principle employed allows the pump to continue to run without harm upon completion of its task.

The pump on this particular process has a 6 ft. suction and delivers at a rate of 6 tons per hr., a distance of 60 ft. through 2½ in. dia. stainless steel tube, temporated by *Isotape*.

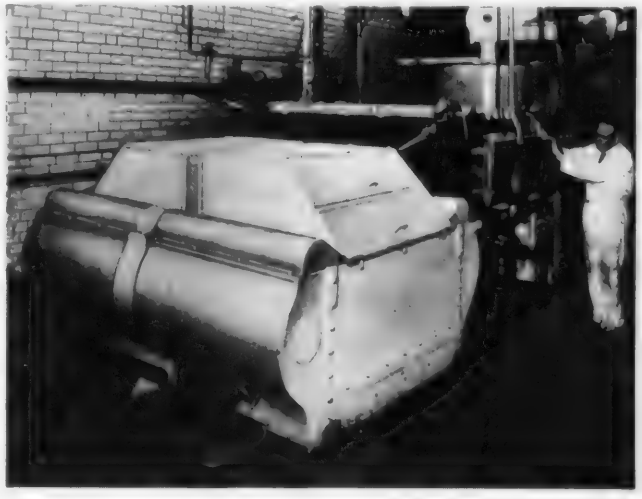
Kunzle, Ltd., are now installing a similar pump on another chocolate set to deliver 140 ft. to storage.

A smaller, *M16 Megator* pump, of similar design, is also used at Kunzles as a portable unit. Mounted on a castored base, it can pump from trolleys or tanks to storage at various points as required.

BAND CONVEYORS

A new range of stainless steel band conveyors incorporating the *Tru-Track* feature has been introduced for the food and confectionery industries by Sandvik Steel Band Conveyors, Ltd.

Basically the conveyors which range from 4 to 32 in. wide, are built up of a series of standard items and units to give a light construction free from crevices which might cause dust collection and the build up of waste material. Use of the *Tru-Track* feature is said to maintain positive tracking despite any misalignment, make in-



A Megator M50 pump is used to transfer chocolate from conche to storage at the Kunzle, Ltd., factory.

The Semi-Micromantle heating unit, made by Isopad, Ltd., is designed for use in micro- and semi-microanalysis.

stallation quick and easy, and eliminate the danger of wear or damage to the edges of the band caused by contact with adjacent structures. Adjustable feet allow a variation in height of up to 6 in., taking care of any fall in the floor level.

The stainless steel surface of the band is smooth and free from any crevices and it is unaffected by hot water and washing down liquids.

ELECTRIC SURFACE HEATER

The recent introduction of semi-micro techniques of chemical analysis has given rise to a demand for miniaturised glassware. To provide the heat usually required, a range of *Micromantle* electric surface heaters for flasks from 5 to 50 c.c. capacity was introduced some time ago.

Refinement of semi-micro techniques has, however, called for an accurately controllable source of heat, and with this in mind a new electric surface heating unit, known as the *Type MIC/VAR Semi-Micromantle*, has now been marketed by Isopad, Ltd. The new unit has been designed in co-operation with Mr. M. A. Fill, F.R.I.C., senior lecturer in chemistry at the Norwood Technical College and Dr. J. T. Stock, associate professor in chemistry, University of Connecticut, U.S.A., who are said to have been largely responsible for the rapid development of micro-chemistry. The flasks are cradled in a shaped pliable heating surface made of glass fibre yarn interwoven with insulated electric resistance wire. The grey stove-enamelled metal casing protecting the heater incorporates a variable resistor for the stepless adjustment of the operating temperature. A supporting rod may be mounted to which top-heavy glass assemblies can be clamped.

The *Semi-Micromantle* has a consumption of 30 W. from a 200/250 V. A.C. or D.C. supply. The temperature range is from ambient up to 270°C. and is infinitely variable. The pliable heating surface ensures such a high rate of heat transfer that a liquid temperature of 240°C. can be attained in 6 min. Unlike open flames, this heater is said to be unaffected by draughts or the spilling of liquids on it.

GLUEING AND CRIMPING MACHINE

A machine of Continental design which may be used for glueing and crimping bags in one operation at a speed of 30-50 per min. is now being marketed by W. J. Hart and Sons (London), Ltd.

The machine is known as the *Fermator* and it may be used on bags from 1-5½ in. wide and from 2-8 in. long.

The filled bags are stacked on an adjustable plate and are then easily fed by hand into the machine. From that point operation is automatic. First the still-unsealed bag passes over a small wheel which deposits a thin film of glue approximately ⅛ in. wide right across the bag. Shaped guides turn the flap over, and press it on to the glued strip. The bag then passes through the crimping mechanism.

Only 1 operator is needed for this machine, which is powered by a $\frac{1}{10}$ h.p. motor. The base of the machine is 9 in. × 12 in., with an additional projection of an adjustable plate. The machine weighs 28 lb. without the motor and it may be placed on any table.

The Sureseal dust-tight valve, made by W. S. Barron and Son, Ltd. The unit is shown connected to the mouth of a bag which is to be filled.

The new Premier Mark II Dispersion Mill is a bench unit for either batch or continuous production at up to 30 gal. per hr. A larger model with an output capacity of up to 150 gal. per hr. is also available.

DISPERSION MILL

Premier Colloid Mills, Ltd., are producing a new dispersion mill which is initially being made in two models, a bench unit and a production unit.

The mills have only one moving part, the rotor, and this, combined with the fact that there is no contact between the shear plates, is claimed to keep wear, maintenance and replacements to the minimum.

The rotor of the bench unit has a 3 in. diameter and the machine may be powered by either a 2½ or a 5 h.p. motor. The capacity of the hopper is 3 gal. and the unit has an output of between 5 and 30 gal. per hr.

The production unit has a 6 in. rotor and may use either a 5 or 10 h.p. motor. Its hopper capacity is 5 gal. and its output 25-150 gal. per hr.

Both are free-standing units requiring only the connection of electrical and water supplies. They are jacketed for temperature control.

DUST-TIGHT VALVE

A dust-tight valve, which may be remote-controlled either manually or by electrically operated air valves is now being produced by W. S. Barron and Son, Ltd.

Immediate reaction is claimed for this valve, known as the *Sureseal*, since it has 2 pneumatically operated cylinders sealing or opening the 6 in. diameter flow line. The valve is totally enclosed, ensuring that dust nuisance and spillage are eliminated. Opening and closing may be effected by hand where compressed air is not available.

The makers consider that the valve provides full bore passage without impediment.

The valve is 2 ft. wide and 1 ft. 2 in. in height. An air pressure of 80 lb. is necessary for operation.

News Digest

The Food Fair

Plans are now well advanced for the British Food Fair, which opens at Olympia on August 28. A determined effort has been made by the Food Manufacturers' Federation to brighten the interior of the hall by giving it the atmosphere of a typical English fair-ground, and many exhibitors are co-operating in the carrying out of this *motif*. Enquiries for exhibition details have been received from all over the world, and stands have been booked by exhibitors from Great Britain, Australia, S. Africa, New Zealand, the U.S.A., France, Spain, Italy, Bulgaria, Western Germany, Hungary, Holland, Czechoslovakia, Yugoslavia, and Sweden.

The French contribution will include an exhibit by l'Association pour la Propagande des Produits Agricoles, the equivalent of our own National Farmers' Union, which is being designed to represent markets from Normandy, Brittany and Provence. The National Farmers' Union itself will sponsor the exhibit "Fresh Food from British Farms," which will be one of the biggest at the fair. It will include a display of cheeses, a milk bar, and a reproduction of an egg packing station.

The Institute of British bakers is also putting on an ambitious show, with a complete model bakery making bread, cakes and confectionery, manned by individual craftsmen and students from several bakery schools.

The theme of a "Fair" will be furthered by the U.S. exhibit, which against a background of country scenes will depict an American State Fair, with lavish displays of foods which have been chosen especially to appeal in Britain, who are the biggest overseas buyers of American agricultural produce. A wide range of precooked and frozen foods will be shown, and demonstrators will prepare appetising dishes using some of the world's most up-to-date kitchen equipment.

A further fair-ground touch will be provided by the stand of the Collapsible Tube Manufacturers' Association, whose centre piece will be a rotating Maypole.

Of all the many delicacies which will be on show, none sound more tempting than those which will come from the tiny village of Fochabers in north-east Scotland. Grouse which will have been shot for only a few days when the fair opens, packed in port wine jelly, pheasant and partridge, also in appropriate wine jellies, will vie for favour with the firm's pride, Cock-a-leekie soup, in the stand of the House of Baxter. Not least this firm will exhibit vintage marmalade, matured in whisky casks for five years.

The fair as a whole promises to be the most lavish yet staged, and a record attendance is expected.

Another season begins. The first of the new crop of strawberries being received at Birds Eye's quick-freezing factory at Lowestoft.

New coffee market opens

The new coffee futures market opened in London with a seller's offer of 292s. per cwt. for coffee for November delivery. Dealers were neither surprised or disappointed that business on the first day was not heavy: trade amounted to 57 lots of 5 tons each.

The market closed steady with sellers at 282s. 6d. and buyers at 282s. for November delivery.

The general feeling among dealers was that it will take up to 6 months before the market is really under way. Nevertheless it is felt that the London market will provide an opportunity for hedging against robusta coffee price fluctuations and that therefore its success is almost assured.

Texture in foods symposium

A symposium on "Texture in Foods" has been arranged by the Food Group of the Society of Chemical Industry. It will be held on October 13 and 14, 1958, at the Royal Society of Medicine, Wimpole Street, London, W.1. At least 14 papers will be read.

Fuller details may be obtained from the Assistant Secretary of the Society of Chemical Industry, 14, Belgrave Square, London, S.W.1.

Microbiology courses

Courses in microbiology are to be held at the Borough Polytechnic. The first of these will be an introductory course given by Mr. A. Fox, B.SC., while an advanced course in food microbiology will be given by Mr. L. D. Galloway, M.A. Both courses will be held on Tuesday at 6.0 p.m., commencing September 30, 1958.

A laboratory course in microbiology techniques will be given by Mr. L. D. Galloway, on Mondays, 2.0 to 5.0 p.m. commencing September 29, 1958.

Application forms and further details may be obtained from the Head of the Department of Chemistry and Food Technology, Borough Polytechnic, London, S.E.1.

Fish flown from Shetland

Fish being caught in Shetland in the morning are now arriving at Southampton in the evening. This stepping up in delivery pace has been achieved by Scalloway brothers, John and Joe Watt, who have their early morning lobster catch at Sumburgh airport by noon every day. The fish are in Southampton 10 hrs. later, fetching prices which more than justify the increased freight charges. The brothers are said to be servicing their south of England customers quicker than mainland-based fishermen.

British packaging firm

Continental Can Co., Inc., of New York, and Vacuum Research (Cambridge), Ltd., a British firm, have formed a company Vacuum Metallising Processes, Ltd., registered in Britain, for the purpose of promoting and licensing in all territories outside North and South America their jointly developed and patented process for the metallising in vacuum of plastic films and paper, on a commercial basis.

Vacuum Research (Cambridge), Ltd., has been responsible for the design, construction and installation of production metallising facilities now operated by Continental Can Co., Inc., and their licensees in the U.S.A.

OBITER DICTA

● Trade's that bad even them that don't pay aren't ordering. —*Bradford manufacturer, quoted by Mr. W. J. Taylor, Parliamentary Secretary to Ministry of Supply.*

● What—poured whisky away? I think you should bring another charge! It's a shocking thing to steal such stuff to throw it away.—*Chairman of Juvenile Court.*

● Gary Cooper caught the fishing eye of a solitary matron in a flowerpot hat. She fluttered a hopeful hand and dropped a spoonful of raspberries in her lap.—*Daily Express.*

● The fact that we like a particular food is three parts towards the ample and profitable digestion of it. A little bit of what you fancy does you good, and to hell with the calories and protein content of it.—*Dr. Charles Hill, Chancellor of the Duchy of Lancaster.*

● The construction of the Kariba Hydro-electric project in Rhodesia has stimulated a social revolution among the Batonka People, the most primitive tribe hereabouts. A year ago the exchange rate for a hen was a jam jar full of salt. The price is now 7s. 6d.—hard cash.—*Manchester Guardian.*

● A piece of skin-like material found in a tin of Japanese mandarin oranges was submitted by a distressed housewife haunted by the possibility of it being a shred of skin from a human hand. We were able to dispose of any theory relating to a Japanese Bluebeard by identifying the fragment as part of the inner layer of the orange skin.—*Report of the Birmingham Public Analyst.*

● Now we appear to be witnessing another such craze, that of the home-made ginger beer. Readers who were young enough to have been bitten by the diabolo craze years ago, will recall the slogan that was on the lips of everyone about that time, Ginger you're balmy. They will wonder whether modern youth will make as free with Ginger beer you're crazy. —*Travers' Circular.*

PEOPLE

C. Nichol

R. D. Mason

B. D. ALDRIDGE, formerly works manager/buyer with Monkhouse and Glasscock, Ltd., has been appointed a director of Glenville's, Ltd., custard powder manufacturers.

■

MR. G. H. GUNSON has been appointed a director of the British Sugar Corporation. He is a managing director of Helbert Wagg and Co., and a director of a number of other companies.

●

MR. CHRISTIE NICHOL has been appointed as sales manager of the Food and Beverage Division of A. Boake, Roberts and Co., Ltd. He joined Abrac in 1951 and, until this new appointment, served as special representative in Europe.

■

MR. H. W. PALMER, managing director, Glaxo Laboratories, Ltd., has been appointed to the board of Allen and Hanburys, Ltd., and MR. C. W. MAPLETHORPE, managing director, Allen and Hanburys, Ltd., has been appointed to the board of Glaxo. The two Companies merged on May 30 this year.

■

MR. R. D. MASON, M.SC., F.R.I.C., F.R.A.C.I., M.INST., has been appointed as an executive member of the technical staff of W. J. Bush and Co., and in association with MR. G. R. A. SHORT will act as consultant in the application and development of flavouring materials for food products.

Mr. Mason began his career with J. Lyons and Co., Ltd., and during that period, by evening study, gained B.SC. and M.SC. degrees at London University, and also by examination became an Associate of the Royal Institute of Chemistry.

Later he joined W. J. Barton, Ltd., at Dagenham, Essex, and became a director and general manager. In 1939 Bartons merged with the Weston Organisation and Mr. Mason continued as a director and general manager of a group of bakeries in the London area. During the war he was seconded to the War Office in charge of emergency bread supplies to heavily blitzed areas and to British and Canadian troops of Southern Command. After the war, he organised the Weston Research Laboratories at Chessington and until recently continued as managing director of this formation.

■

MR. F. J. H. OTTAWAY, senior scientific officer at the British Baking Industries Research Station, is leaving Chorleywood this month to take up an appointment with the Bread Institute of Australia. He has been closely associated with the Research Association's programme of research on biscuit production problems and the preservation of baked products, and is co-author of a number of publications in these fields.

●

DR. JOHN HAWTHORN, F.R.I.C., of the Royal College of Science and Technology, Glasgow, has been appointed to the Chair of Food Science which has just been established in the college. He has been principal lecturer on this subject for the past two years.

The Food Science section is at present attached to the Department of Pharmacy, but from next session it will be an independent department. The development has been brought about by the growing importance of the food industry and the increasing application of scientific methods of production and control.

■

MR. G. N. PILGRIM has been appointed representative for W. J. Bush and Co., Ltd., in Warwickshire, Staffordshire, Worcestershire, Shropshire and North Wales.

He returned to England in 1954 from Switzerland, where he lived from 1947, to take up the appointment as deputy general manager of the Birmingham section of the British Industries Fair, and held this position until the fair was discontinued.

Obituary

The death is announced of MR. F. G. ANDREAE at the age of 71. He joined the Triplex Safety Glass Company in 1929; in 1935, on the formation of Quickfit and Quartz, he was appointed sales director of the company, and held this position until his retirement in 1950.

■

The death occurred recently of Mr. George Lingard, aged 54, who was managing director of N. Kilvert and Sons, Ltd., lard manufacturers. He joined the firm as an office boy in 1917. He was a man of outstanding personality and he will be greatly missed by the company and all who knew him.

COMPANY PROFITS AND PROSPECTS

Virol dividend unchanged

Virol are paying an unchanged dividend of 30%. The group profit after a lower tax charge shows a fall at £126,346 compared with £138,782.

•

Same dividend for millers

White, Tomkins, and Courage are paying a 10% final dividend making a total of 15% for the year ending March 31, 1958. Their net profit rose from £118,640 to £172,623.

•

British Sugar Corporation raises dividend

The British Sugar Corporation has announced a dividend of 6% for the year ending March 31, 1958. This compares with 5½% for the previous year and 5% for the year before that. The net profit for the year amounted to £774,640. The profits for 1957 comparable with those of 1958 were £632,278.

•

J. Lyons increase profits

According to the annual report of the directors of J. Lyons and Co., Ltd., the net profit for the year ending March 31, 1958, amounted to £1,143,111 compared with £871,767 for the previous year.

It was proposed to pay a final dividend of 1s. 10d. per £ unit, making a total of 2s. 10d. per £ unit for the year, on the ordinary and "A" ordinary stock, and a final dividend of 4·4d. per £ unit on the proportional profit stock or "B" proportional profit shares, making a total of 9·2d. per unit.

•

Combating the continual rise in costs

Cerebos, Ltd., are proud of the measure of success which they have achieved in their efforts to combat the continual rise in costs, according to the annual statement of the chairman, Mr. W. Arnold Innes. His issued statement is accompanied by a chart which shows that the average adjustment in the prices of the group's products amounted to 7% in the past 6 years, while the average increase in the wholesale price of products of the food manufacturing industries amounted to 32% in the same period.

The net profit for the year ending December 31, 1957, after providing for taxation and making allowances for outside interests in the profits of subsidiary companies, amounted to £822,180 not counting profits brought forward from 1956. The trading profit for the group amounted to £1,894,572, an increase of £193,232 over the 1956 figures.

A dividend of 32½% for the year was recommended.

Bovril group profits expand

The group profit of Bovril rose sharply during 1957 to £864,536 including £52,250 in respect of previous years against £695,762 in the previous year. The net profit rose from £298,596 to £386,125.

The dividend on the Deferred capital was maintained at 16% with a final dividend of 13½% as before.

The parent company made a profit of £342,292 against £277,765.

•

APV lose on Canadian subsidiary

Dr. R. J. S. Seligman, chairman of the A.P.V. Co., Ltd., reported that it had been found necessary to write down the investment in the Canadian subsidiary by £43,191 out of the parent company's profits. Taxation on the group's profits was also considered to be disproportionately high since it had not yet been possible to obtain tax relief on the loss incurred by the Canadian firm.

The group profit before taxation was £222,255 (234,817). A dividend was not recommended on the Ordinary shares.

•

Co-op trade

The half-yearly report of the United Co-operative Baking Society, Glasgow, states that net sales for the half-year amounted to £3,995,057, which shows an increase of £20,015 compared with the corresponding period of last year.

After meeting all expenses, the surplus, including the balance of £4,275 brought forward, amounts to £371,446. This permits of a dividend of 1s. 8d. per £ of sales—an increase of 2d. per £ over the previous and corresponding half-years.

For the full year the net sales totalled £7,868,473, an increase of £6,074.

•

New factories completed

Mr. Reginald H. Palmer, chairman of the Associated Biscuit Manufacturers, Ltd., stated in his annual report that the two new factories at Avonmouth and Huyton were now completed as far as any factory in this era of change and improvement can be called finished. Both companies were not only producing a large tonnage, but were also contributing substantially to the profits of the two main subsidiaries. Both were able to command an adequate supply of workers.

The profit of the group before charging taxation amounted to £1,560,499 a decrease of £68,421 on the previous year. A final dividend of 8% less tax making a total of 12% less tax, for the year ended December 31, 1957, was recommended.

Erections and Extensions

The Drambuie Liqueur Co., Ltd., are enlarging their bonded warehouse at Leith, Scotland.

•

Burdetts, Ltd., bakers, are extending their bakery at Farmside Place, Levenshulme, Manchester, 19.

•

M. A. Craven and Son, Ltd., are planning to extend their French Almond Works, in Foss Islands Road, York.

•

Schweppes, Ltd., mineral water manufacturers, are having a storage depot built in Mitcham Road, Blackpool, Lancs.

•

Four Elms Packers, Ltd., Edenbridge, Kent, have opened a new packing station at Model Farm, Crockham Hill, Edenbridge.

•

J. and A. Ferguson, Ltd., bakers, are having an extension built at their bakery in Merrylee Road, Glasgow, S.4, Scotland.

•

The Co-operative Wholesale Society, Ltd., are having a bottle sterilising works erected at Broomfield Street, London, E.14.

•

South-Western Mineral Water Co., Ltd., are extending their factory at 124-130, Malmesbury Park Road, Bournemouth, Hampshire.

•

John Mackintosh and Sons, Ltd., are having an extension constructed to their factory at Albion Mills, Halifax, Yorks.

•

Weston Biscuit Co., Ltd., have been granted planning permission to build a £50,000 extension to their factory at Sighthill, Edinburgh, Scotland.

•

William Sword, Ltd., bakers, of Airdrie, have had plans approved to erect a bakery on a site at Keptie Road, Arbroath, Angus, Scotland.

•

The Crolla Ice Cream Co., Ltd., have had plans drawn up for the construction of an ice cream factory at Pilkington Street, Newcastle-on-Tyne.

•

Carlsberg Sales, Ltd., have had plans approved for the erection of a lager bottling factory on the Radcliffe Road Industrial Estate, Goole, Yorks.

Food News Overseas

Australian cane harvesting

Indications have been given that the harvesting of sugar in Australia may soon be carried out mechanically.

Answering a question in the House of Representatives, Mr. William McMahon, Minister for Primary Industry stated that an agreement had been reached with the industry that the Government should contribute on a basis towards the cost of importing and developing mechanical equipment for this purpose.

One Louisiana harvester had been imported and although tests with this machine had proved successful some of its parts had had to be adapted for the Australian conditions. An alternative type of mechanical harvester is being developed by the Department of Primary Industry.

Shortage of Australian dried fruit

Heavy Continental buying is cutting down total shipments of Australian dried fruits to Britain this season. Estimated supplies of 38,000 tons of sultanas and 6,000 tons of currants for the British market are now reduced to 30,000 and 4,000 respectively. There may be a slightly better supply of seeded raisins than hitherto.

Chief reasons for the increased European interest are stated to be the exceptional high quality of the crop, and the general shortage of supplies on the Continent.

The quality shown in sultana shipments is equalled by the parcels of currants coming forward. The currants which have already arrived have been quickly taken up because of their excellent appearance and taste.

Australian wine report

The past year has been a very successful one for Australian wines, stated Mr. W. T. B. Stokes, at the a.g.m. of the Australian Wine and Spirit Association (Great Britain) in London recently. Mr. Stokes, the retiring chairman, said in his report that their trade had continued to expand during the past 12 months and a great deal of the credit for this revival could be attributed to the publicity campaign organised by the Australian Government.

At the same time tribute was paid to the substantial contribution of the leading proprietors of various brands of Australian wines on this market who have done so much to further the interests of the trade generally in their expenditure on advertising their own brands and in other directions.

South African agents

Following the tour recently carried out in Rhodesia and South Africa by Mr. W. J. W. Proctor, sales director of Follsain Wycliffe Foundries, Ltd., they announce the appointment of the following agents: Union of South Africa—H. Incledon and Co. (South Africa), Ltd., P.O. Box 3620, Johannesburg; Northern Rhodesia (except Livingstone)—J. L. Curtis, Ltd., P.O. Box 140, N'Dola; and Southern Rhodesia and Livingstone—Mine - Elect (Pvt.), Ltd., P.O. Box 316, Bulawayo.

These agents will handle all Follsain Wycliffe products including the *Pulmac* range of pulverisers.

South African lucerne meal

An existing firm of millers has opened a new mill for the manufacture of lucerne meal at Moddel River, Cape Province, South Africa, and has also taken over a dehydrated lucerne plant at Pokwani in the Vaal-Hartz Settlement. The plant has been shut down for several months. According to the manufacturers, dehydrated lucerne has a very low fibre content, a protein value of approximately 23% and contains about 100,000 International Units of vitamin A per lb. It is, therefore, claimed to be a vastly superior product to sun-dried lucerne. The colour of the dehydrated meal is stated to remain the same dark green as that of growing lucerne since it is processed and bagged within hours of cutting. The company is also erecting a new mill for general milling purposes at Howick, to which it will transfer its Natal activities from Pietermaritzburg shortly.

Coffee in Dominican Republic

The Dominican Republic Department of Agriculture has established nurseries for 135,000 Arabian coffee plants in the western area of Aguas Negras. This will enable 16,000 acres of newly settled land to start coffee production in 1959-60.

Last year's coffee crop in the Republic was disappointing due to drought, the value of coffee exports dropping from £11·9 million in 1956 to £8·5 m. last year. However, the total figure for food crop exports rose from £35 m. to £44 m. in 1957. This year's coffee crop is expected to reach the 1956 level, and the government's steps to encourage coffee growing show confidence in the future of the industry.

Dominican meat products exports

The Dominican Republic meat processing firm of Ganadera Industrial Dominicana is entering the international market to an increased extent following a very successful display at the recent New York Fair which was seen by 70,000 people. The firm's products include ham, frankfurters and bacon. Increased production by Ganadera Industrial, leaving a greater surplus for export, has followed government encouragement of stock-breeding and the elimination of livestock disease.

Norwegian seaweed drink

A health drink, made in Norway from seaweed and fortified with vitamins from fruit concentrates is being marketed in Scandinavia. It is known as *Viamin*, and it is produced in Kristiansund. Developed by two doctors from Oslo, the drink has been tested clinically for 3 years with good results.

Sea plants are said to be generally richer than land plants in vitamins, amino acids and minerals and are finding increasing use in the production of foods and fodders.

Israel rice-growing experiment

The growing of rice in the recently reclaimed Lake Hula area of Israel has proved successful, according to Barclays Bank D.C.O. The yield last season was 400 kg. per dunam and it is planned to increase the area under rice to 750 acres this year.

Experimental rice growing commenced four years ago, and it has been proved, adds the bank, that better results are obtainable by the sprinkler method of irrigation than by flooding.

Ice-cream factory

Plans for a fourth ice-cream factory, to be built at Gloucester, are announced by T. Wall and Sons (Ice Cream), Ltd., and are under consideration by Gloucester City Council. It is hoped that the construction will begin this autumn, in which event the factory will be in production in 1960.

The new factory, with an initial manufacturing capacity of about 10 million gal. of ice cream and fruit ices each year, is expected to employ at least 400 people. Adjoining the factory will be a large cold store holding about 750,000 gal. of ice cream.

Packaging

Outer wrapping for biscuit pack

The outer wrapping for the pack of *Orange Coconut Royal* biscuits made by Carr's of Carlisle is made from multi-coloured, printed *Diolam*.

The company's name, the name of the biscuits, and the half-tone illustration of the biscuits give the pack a strong point of sale impact.

These wrappers are manufactured and printed by Transparent Paper, Ltd.

Packaging machinery agents

The Italian firm of Sarsa, S.p.A., have concluded an agreement with Packaging Machinery (Peters), Ltd., whereby the British firm will act as sales agents for the Z.350 series of automatic unit packaging machines.

The countries covered by the agreement are: United Kingdom and Northern Ireland, British Commonwealth, Canada, U.S.A., Denmark, Norway, Sweden, and Finland.

The machines are designed to pack a wide range of products in either strip or sachet form.

Export pack for biscuits

With *Penguin* chocolate biscuits firmly established as a selling line in Britain, Wm. Macdonald and Sons (Biscuits), Ltd., have for some months past been sounding out the American market for this product. The U.S. version is called *Kiltie*. It sells at 10 cents and the packaging and presentation emphasise its Scottish origin.

So far, it is stated, test-marketing in the eastern States has produced encouraging results. Macdonalds' plan is to widen distribution gradually until the major part of the U.S. is covered and then, if the situation warrants it, to begin advertising to step up sales.

Canned mineral waters

A French firm, the Evian Water Co., has begun to supply its mineral waters in cans. This technical achievement is brought about as the result of experiments carried out by Boxal, a French aluminium company, who claim to have developed an oxidised aluminium can which does not make the water taste.

The new container may find rapid favour with firms who export their produce. According to the *Financial Times*, the contents of 3 normal mineral water bottles which weigh 4½ lb. can be put into a can weighing less than half a pound. An example quoted is saving of 600 tons for every 1 million of bottles transported.

Netlon, the new thermoplastic net used as a packaging material.

The Diophane wrappers on these cakes made by Howell and Hall, Ltd., are printed to match the colour of the cake.

Cake wrappers

Cut cakes, made by Howell and Hall, Ltd., are now being wrapped in a range of transparent Diophane wrappers made by Transparent Paper, Ltd.

The wrappers are printed in 2 colours—white and one other colour—the other colour changing with the cake. The company's flash is easily recognisable throughout.

New packaging material

The British selling rights of *Netlon* for packaging and allied fields have been acquired by Spicers, Ltd., from the manufacturers, Blackburn Pioneer Mill, Ltd.

Netlon is made of thermoplastic materials by a process in which the filaments are fused, instead of woven. In appearance it is like an endless tube made of netting. It can be cut to any required length and, when sealed at both ends, securely contains any articles put into it which are large enough to be retained by the mesh. The thickness of the filaments, the diameter of the tube and the mesh size can be varied to suit a wide variety of purposes. The prepacking of fruit and vegetables and the protection of delicate surfaces during transit are applications for which *Netlon* has already proved most suitable.

The outer wrapping of the Orange Coconut Royal biscuits, produced by Carr's of Carlisle, is made from Diolam.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

797,613. E. VALENTE: Apparatus for making beverages.

797,638 R. PARISI: Apparatus for the freezing and delivery of portions of ice cream.

797,848. S. J. POPEIL: Food chopper.

797,858. N. S. DENNIS: Fruit juice extracting device.

797,879. A. GÜNTHER: Machines for making sausages.

798,769. W. L. MORRISON: Chilling, storing and transport of foodstuffs and the like.

798,791. SOC. G.D. IN ACCOMANDITA SEMPLICE: Apparatus for feeding articles such as caramels into a machine.

798,863. NATIONAL RESEARCH DEVELOPMENT CORPORATION: Treatment of milk.

798,881. MAGNETRIT AKT.-GES.: Method of purifying sugar-containing juices.

798,887. DAIRY SUPPLY CO., LTD.: Packing of cheese curd into moulds.

799,086. BAKER PERKINS, LTD.: Baking or like ovens.

799,121. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION: Production of Cheddar-type cheeses.

799,166. UNILEVER, LTD.: Extruded protein products.

799,240. AMERICAN CYANAMID CO.: Treatment of dressed poultry with antibiotic compositions to prolong the shelf life thereof.

799,254. TOLEDO SCALE CO.: Meat mincing device with improved mincer barrel.

ABSTRACTS OF BRITISH PATENTS

Ice cream manufacture

This invention is concerned with improving the manufacture of wrapped portions of ice cream.

A method is provided for preparing a wrapped portion of ice cream in which a receptacle with a blank carton inside is charged with ice cream, thereby forming an outer wrapping for the ice cream. Carriers are inserted into apertures in the carton so that upon severing the loaded receptacle between the apertures there is provided a number of wrapped portions, each of which has a carrier.

A blank carton and a method for inserting the blank are provided.—794,437. *J. Lyons and Co., Ltd.*

Flavouring margarine

The object of this invention is to give a butter-like flavour to foodstuffs, such as margarine and so on which are made from or contain animal or vegetable oils or fats, by a method which does not depend on the incorporation of butter or any other milk-fat product for the butter flavour.

It is known that this can be attained by the incorporation of a lactone of an aliphatic delta-hydroxy, gamma-hydroxy or episilon-hydroxycarboxylic acid. The present invention is stated to be an improvement on this process in that a small proportion of an ester of aliphatic gamma-, delta- or episilon-hydroxy C_8-C_{14} carboxylic acid is added to the foodstuff.

An example of the process is given in which a mixture of 50 g. of the lactone of delta-hydroxy decanoic acid, 238 g. of glycerol and 2·5 g. of concentrated sulphuric acid was heated under carbon dioxide on a steam bath for 4 hr. and cooled at 120°C. for 1 hr. The product was cooled, diluted with water containing free sodium bicarbonate in slight excess over the free acid and the solution extracted several times with ethyl acetate. The combined extracts were washed 5 times with brine to remove the excess glycerol, dried over anhydrous magnesium sulphate and the solvent removed at a reduced pressure at a temperature of 40°C. The resulting viscous oil was then washed 3 times with light petroleum, after which traces of the solvent were removed carefully at room temperature. The final product had the following characteristics: refractive index at 25°C., 1·4706; acid value, 5·6; saponification value, 214; and net monoglyceride content determined by periodic acid titration, 72%.—797,134. *Unilever, Ltd.*

Technical Press Review

August

Manufacturing Chemist. — Safety in the Chemical Industry; Review of Safety Equipment and Services; Wetting Agents for Agricultural Sprays; Perfumes for Cosmetics—2: Face Creams; Silicone Polishes; Lemongrass Oil from Ceylon; Progress Reports: Cosmetics and Toilet Preparations; Disinfectants and Disinfection; Detergents and Detergency.

World Crops.—Weed Control: How a Herbicide Works; Scrub Clearance by Chemical Means; The Eradication of Water Hyacinth; The Risks of Pesticides to Fish; Review of the Royal Show.

Dairy Engineering.—Glass for Pipelines; Pipes and Pipe Fittings; Advanced Mechanisation: Towards Automation; Notes on Rinsing Techniques—1; "Tailor-Made" Instant Milk; Large-Scale Processed Cheese Production.

Atomics and Nuclear Energy.—American Civilian Power Reactor Programme; America Prospects for Economic Nuclear Power; Description of the Sodium Graphite Reactor; Thermo-Nuclear Fusion Power; Ceramics in Nuclear Energy; The Effect of Heavy Radiation on Metals; Poland's Nuclear Power Programme.

Automation Progress.—Automatic Programming and Magnetic Amplifiers in Rolling Mills; Progress in the Automation of Steel Making; Low Cost Data Logging; Modern Foundry Doubles Output; Continuous Heat Treatment with Automatic Control; The Design of Electrically Controlled Machine Tools; Semi-Conductors and their Uses.

Corrosion Technology.—Propeller Corrosion and Cavitation Erosion; Cathodic Protection of Ballast Tanks; New System to Beat Hull Corrosion.

Trade Marks

DAIRYGLEN.—766,280. All goods in Class 29. **London Grocers, Ltd.,** Dairyglen House, Crossbrook Street, Waltham Cross, Herts.

SKIP.—766,568. Milk powder. **Golden Glow, Ltd.,** Central Buildings, North Street, Guildford.

COUNTRY TOWN.—766,678. All goods in Class 29. **Ruddin and Son, Ltd.,** "Colonial House," 63, Corporation Street, Manchester, 4.

DANEFROST.—B766,904. Edible cream, milk and vegetables, all being frozen. **Danefrost Trading Co.,** Maelkecentral A/S, Nyborg, Fyn, Denmark.

PRIMERAVERA TELE - CANDYS.—755,241. Candy, being non-medicated confectionery. **W. E. M. Townsend,** 47, Wool Exchange, Coleman Street, London, E.C.2.

DAIRYGLEN.—766,281. All goods in Class 30. **London Grocers, Ltd.,** Dairyglen House, Crossbrook Street, Waltham Cross, Herts.

DISC JOCKEY.—768,505. Non-medicated sweets and bubble gum. **Madison Confectionery Products, Ltd.,** 45, Latimer Road, London, W.11.

SUNCROFT.—768,749. Flavourings for food and beverages (other than essential oils). **C. W. Field, Ltd.,** Edwards Lane, Speke, Liverpool, 19.

MIN-SKELS.—768,840. All goods in Class 30. **Smith Kendon, Ltd.,** 132, Borough High Street, London, S.E.1.

MADAMOISELLE.—769,355. Chocolate, chocolates; and chocolate and sugar confectionery, none being medicated. **The Nestlé Co., Ltd.,** Hayes, Middlesex.

SPRINGWATER.—766,023. Fresh fruits and fresh vegetables (other than watercress). **Erith Meat Products, Ltd.,** 44, South Road, Erith, Kent.

PREEN.—767,597. Foodstuffs for birds. **Petfoods, Ltd.,** Melton Mowbray, Leics.

SUNCROFT.—768,750. Fruit juices and non-alcoholic fruit extracts (not being essential oils. **C. W. Field, Ltd.,** Edwards Lane, Speke, Liverpool, 19.

DUTCH GLORY.—B763,175. Poultry, poultry products (for food), fruits and vegetables, all being preserved, dried, bottled, cooked or canned. **Struik's Conservenfabrieken Naamlooze Vennootschap,** Voorthuizerstraat No. 9, Voorthuizen, Holland.

ALFONA.—767,026. Milk products and dairy products, all for food. **Alfonal, Ltd.,** 12, Grosvenor Place, London, S.W.1.

FORTIMEL.—767,695. All goods in Class 29. **Van Den Berghs (Export), Ltd.,** Unilever House, Blackfriars, London, E.C.4.

REXIES BRAND.—767,808. Non-medicated confectionery. **G. F. Lovell and Co., Ltd.,** "Rexville," Albany Street, Crindau, Newport, Monmouthshire.

TECHNI. — 769,023 Non - medicated sugar confectionery and chocolates. **Robertson and Woodcock, Ltd.,** Trebor House, Woodford Avenue, Ilford, Essex.

BUSTER.—749,688. Food for animals. **Chappie, Ltd.,** Melton Mowbray, Leics.

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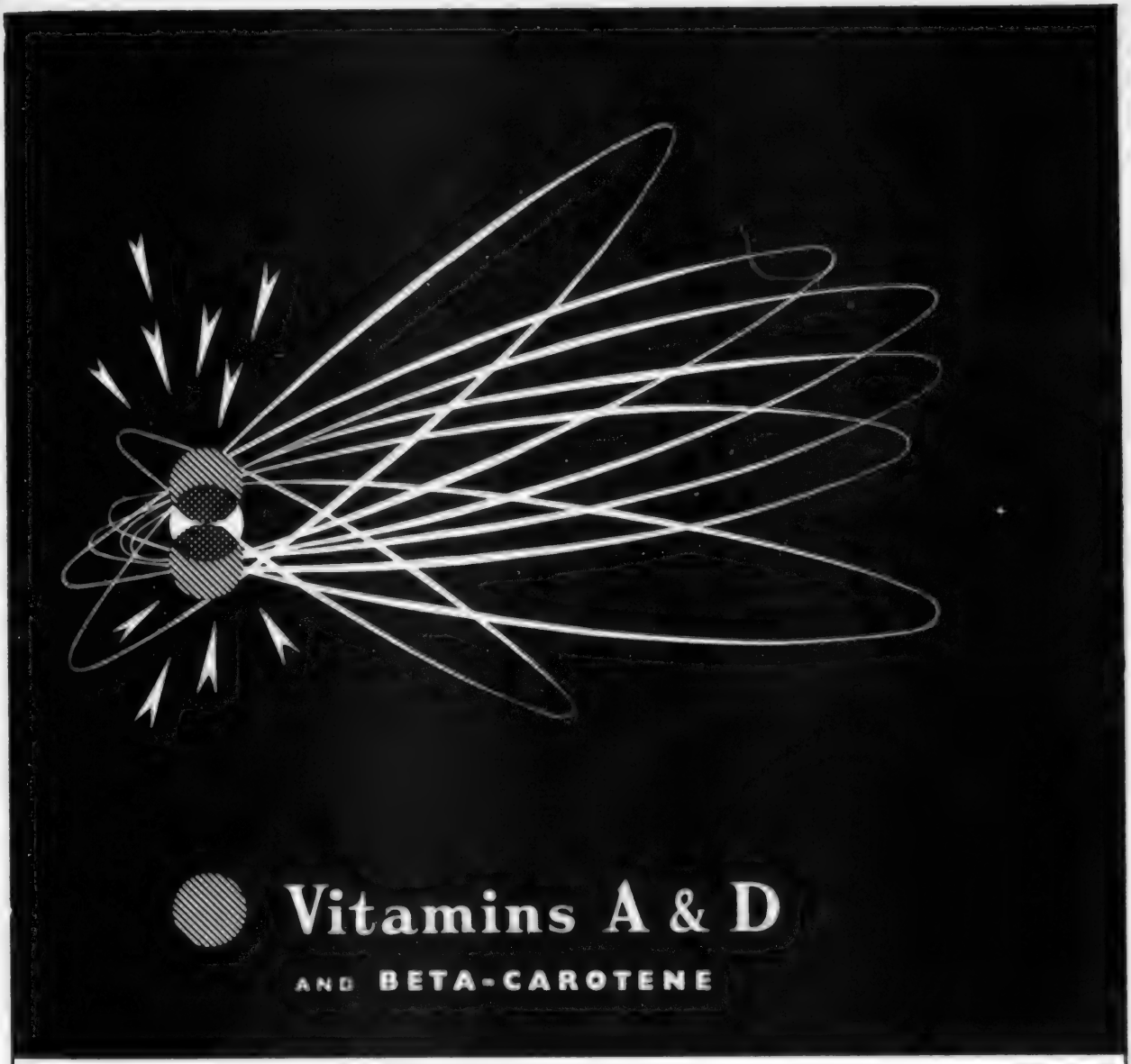

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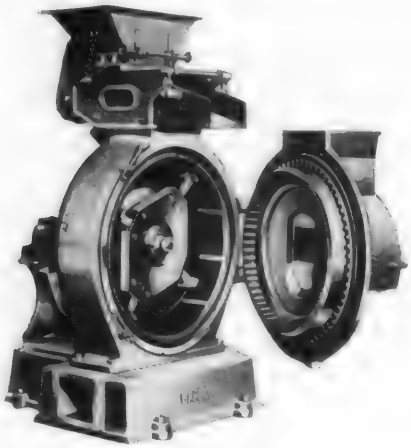

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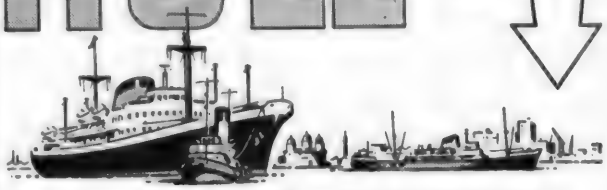

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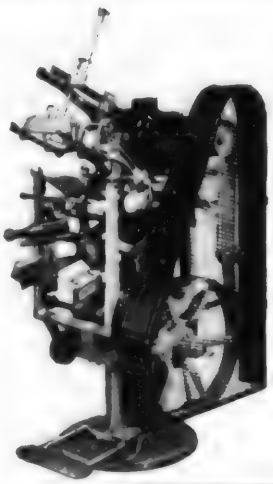

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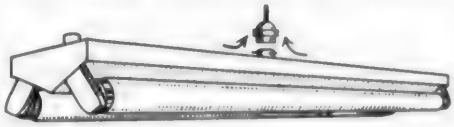

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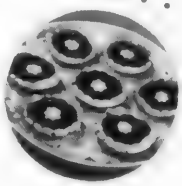

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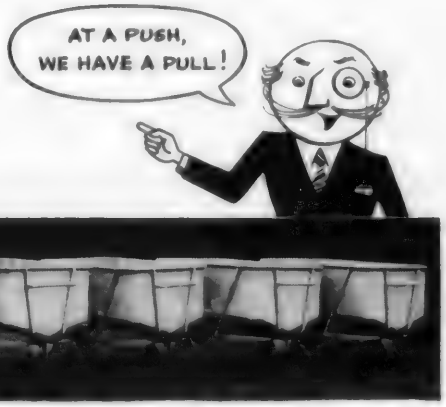

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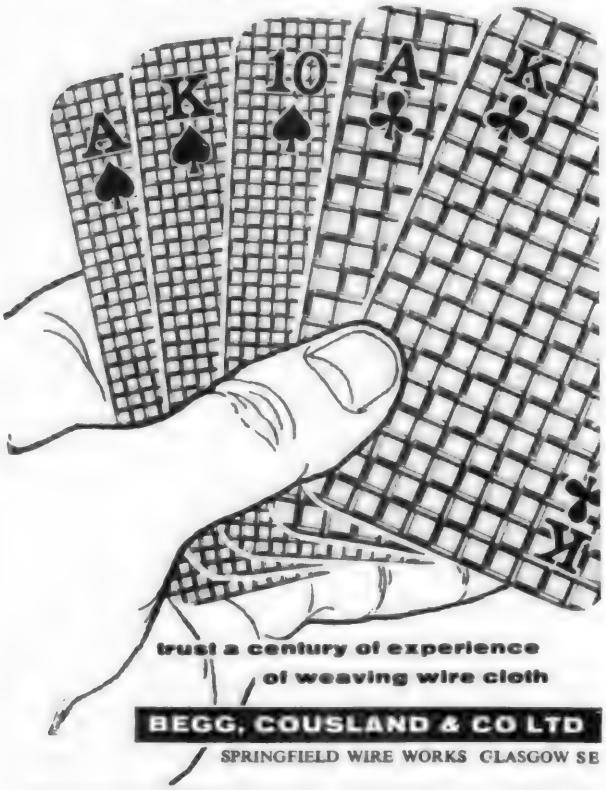

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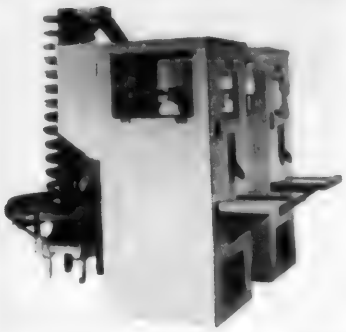

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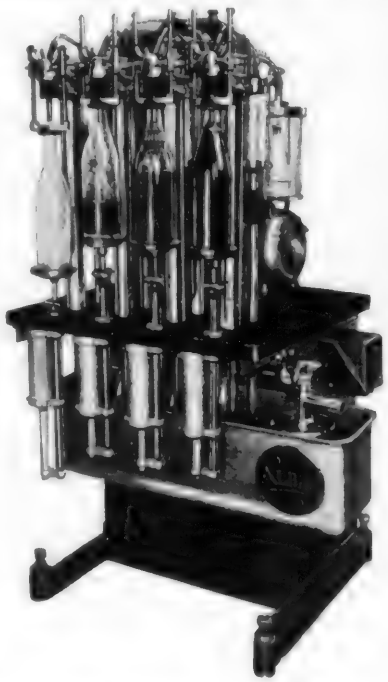

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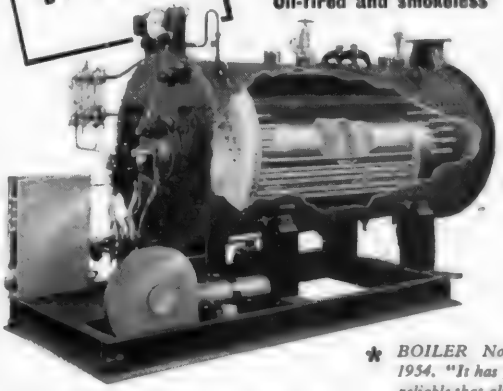

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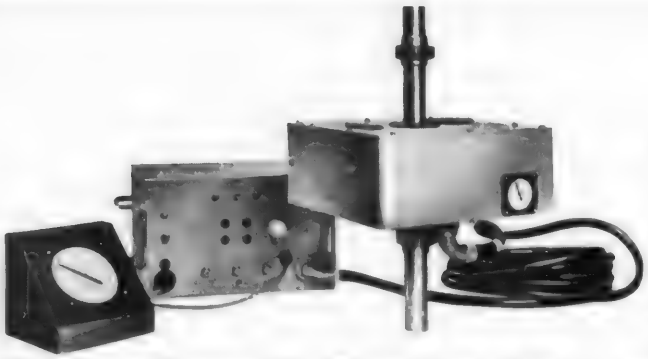

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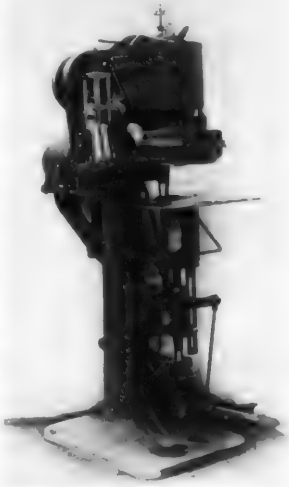

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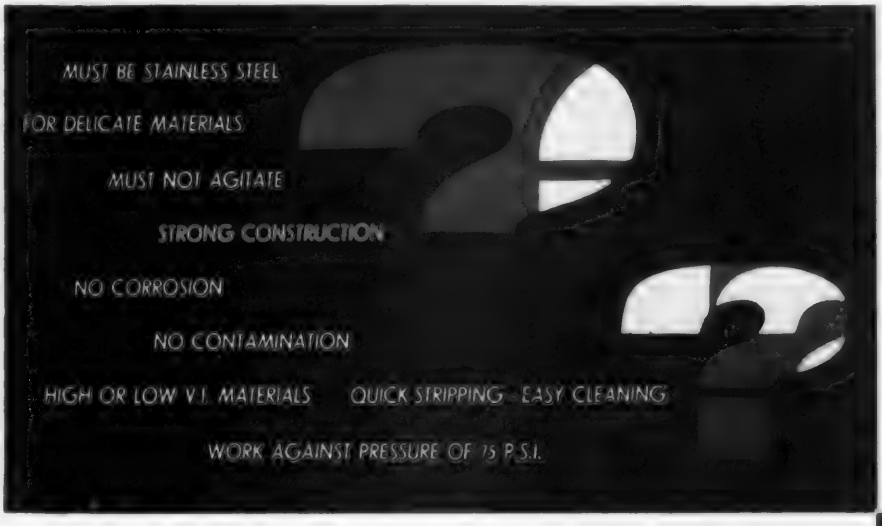

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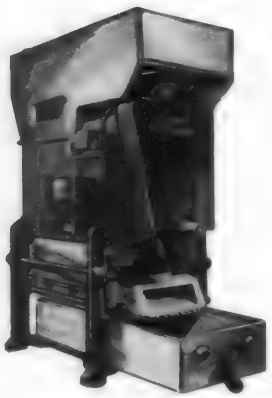

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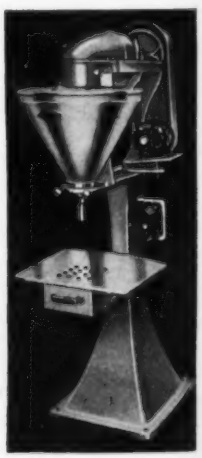

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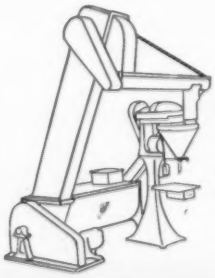

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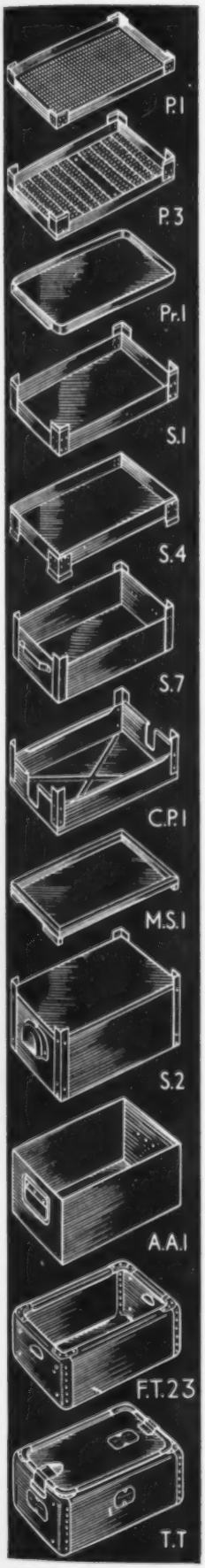

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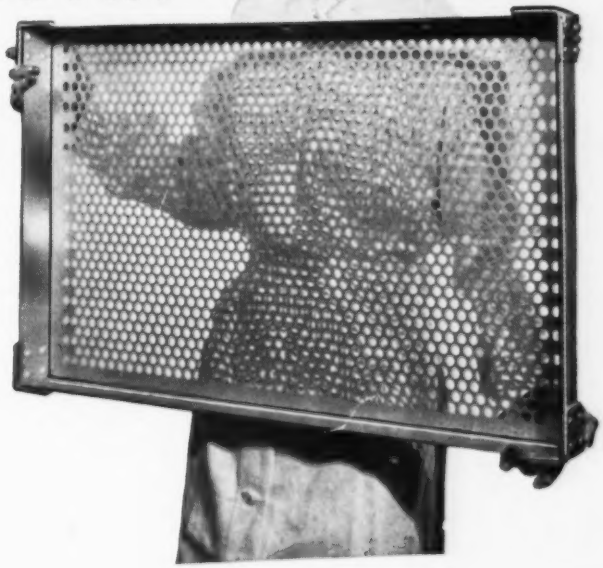

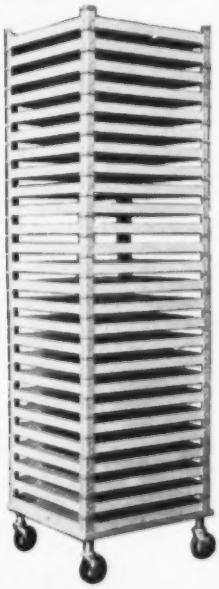

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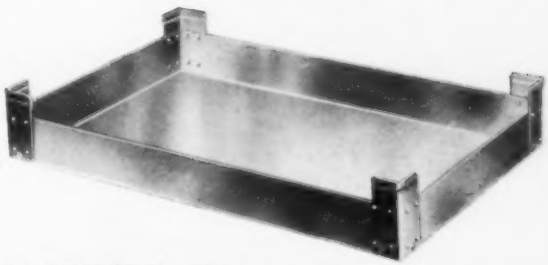

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